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Semiconductor Short Form Catalog

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SHINDENGEN

⚠ Although we are constantly making every effort to improve the quality and reliability of our products, there nevertheless remains a certain probability that the semiconductor products may occasionally fail or malfunction. Please take careful precautions against product failures or malfunctions to avoid any injuries, fire accidents or social loss by implementing safety designs such as redundancy designs, designs for fire spread prevention, and designs for preventing malfunctions.

⚠ Our semiconductor products listed in this document are not designed or manufactured to be used in devices or systems requiring extremely high levels of quality and reliability, or the failure or malfunction of which may directly threaten human lives or cause injury. In the cases where the products are to be used in devices or systems for special applications or devices or systems for specialized applications shown below, always make sure to consult us in advance.

Special Applications
Transportation device (automotive, marine, etc), communication devices for core network, traffic signal devices, fire prevention/anticrime devices, various safety devices, medical devices, etc.

Specialized Applications
Nuclear power control systems, aircraft and aerospace devices, submarine relay devices, and systems for preserving life, etc.

Even if it is not for a special or specialized application, when IC products are to be used for devices or systems that are desired to last for a long period under continuous operation, please make sure to consult us in advance.

SHINDENGEN

Semiconductor Short Form Catalog

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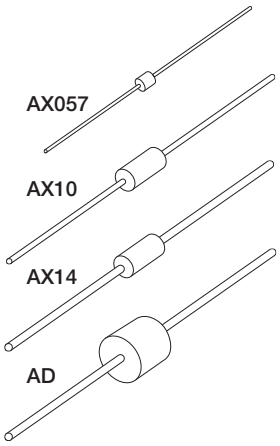
GENERAL RECTIFYING DIODES

Low frequency rectifying

Single

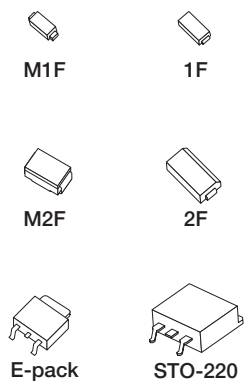
Axial



Type No.	Absolute Maximum Ratings						Electrical Characteristics					Outline		
	Io [A]	Conditions Ta [°C]	IFSM [A]	VRM [V]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	θjl (max) [°C/W]	θja (max) [°C/W]	Package	Color Code	Fig.
D1N60	1	25	30	600	-55 to 150	150	1.05	1	10	10	113	AX057	Silver	1
D1N80				800										
S2V60	1.7	40	60	600				1.7		8	–	AX10	Blue	6-1
S2V80				800									Silver	
S3V100D	3	130*1	150					3	10*2	6.5		AX14	Silver	8
S3V60	3.5	40	120	600				2.6	10				Blue	
S3V80				800									Silver	
☆D10AD100VDE	10	99*1	300	800				10	10*2	5	55	AD	Silver	9

☆ : New product　　*1 : Tl　　*2 : VR=1000V

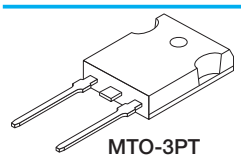
Surface Mount



Type No.	Absolute Maximum Ratings						Electrical Characteristics						Outline	
	Io [A]	Conditions Ta [°C]	IFSM [A]	VRM [V]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	θjl (max) [°C/W]	θja (max) [°C/W]	θjc (max) [°C/W]	Package	Fig.
M1F60	1	25	25	600	-55 to 150	150	1.1	1	10	20	108	–	M1F	12
D1F60										23			1F	13-1
M1F80				800						20			M1F	12
☆LN1F60	1.1	25	25	600			1.05	0.8		23	108	–	1F	13-1
D1F60A	1.2	25	45	600			0.97	1.2		23	108	–	1F	13-1
M2F60		51	50							33	90		M2F	15-1
D2F60	1.4	25	60	600			1.05	1.4		24	90	–	2F	16-1
M1FE40*3	2	103*2	25	400			1.1	1		20	80	18	M1F	12
M3FE40*3	3	76*1	75	400			1.1	3		25	110	25	M2F	15-1
M3F60		100*1	90	600			1.05			16	55	–		
D3F60		80*1	150							23	80		2F	16-1
D4F60	4	68*1	200	600			0.95	4		23	80	–	2F	16-1
DE5VE40*3	5	130*2	80	400			1	5		–	–	4	E-pack	31-5
DF25V60	25	136*2	400	600			1.1	25				0.5	STO-220	36-2

☆ : New product　　*1 : Tl　　*2 : Tc　　*3 : High ESD Capability.

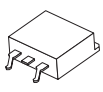
Two Terminal Type



Type No.	Absolute Maximum Ratings						Electrical Characteristics					Outline	
	Io [A]	Conditions Ta [°C]	IFSM [A]	VRM [V]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	Cj (typ) [pF]	θjc (max) [°C/W]	Package	Fig.
S30V60T	30	119	360	600	-55 to 150	150	1.10	30	10	–	0.8	MTO-3PT	95

Center Tap, Common Anode

Surface Mount



Type No.	Absolute Maximum Ratings						Electrical Characteristics				Outline	
	Io [A]	Conditions Tc [°C]	IFSM [A]	VRM [V]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	θjc (max) [°C/W]	Package	Fig.
DF16VC60R	16	124	190	600	-40 to 150	150	1.05	8	10	1.6	STO-220	36-7

Center-tap (R)

GENERAL RECTIFYING DIODES

Low frequency rectifying

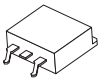
Array

Array

1NA(SMD)

Type No.	Absolute Maximum Ratings						Electrical Characteristics					Outline	
	Io [A]	Conditions Ta [°C]	IFSM [A]	VRM [V]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	θjl (max) [°C/W]	θja (max) [°C/W]	Package	Fig.
S1NAD80	3	102	110	800	-55 to 150	150	1.05	0.75	10	15	84	1NA	27-2

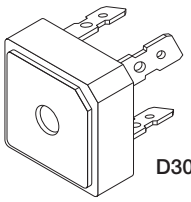
Doubler



STO-220

Type No.	Absolute Maximum Ratings						Electrical Characteristics				Outline	
	Io [A]	Conditions Ta [°C]	IFSM [A]	VRM [V]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	θjc (max) [°C/W]	Package	Fig.
DF5VD60	5	140	140	600	-40 to 150	150	1.05	2.5	10	2	STO-220	36-5
DF15VD60	15	127	190					7.5		1.6		

Diode Module



D30VC

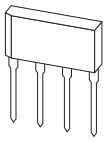
Type No.	Absolute Maximum Ratings						Electrical Characteristics				Outline	
	Io [A]	Conditions Tc [°C]	IFSM [A]	VRM [V]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	θjc (max) [°C/W]	Package	Fig.
D30VC60	30	124	300	600	-40 to 150	150	1.05	15	10	0.9	D30VC	76

Center-tap 

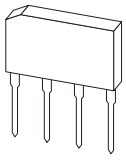
BRIDGE DIODES

Low frequency rectifying

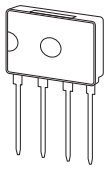
SIP (Single In-line Package) Bridge Diodes



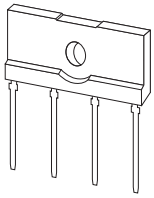
1V



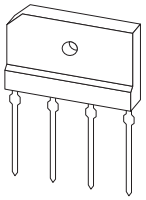
2S



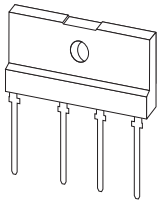
D3K



JB



3S



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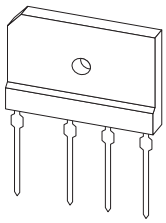
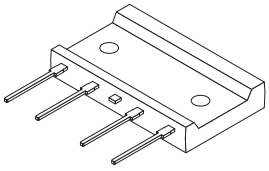


5S



TSB(4pin)

Type No.	Absolute Maximum Ratings						Electrical Characteristics						Remarks	Outline	
	Io [A]	Conditions Tc [°C]	IFSM [A]	VRM [V]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	θjl (max) [°C/W]	θja (max) [°C/W]	θjc (max) [°C/W]		Package	Fig.
S1VB60	1	25*1	30	600	-40 to 150	150	1.05	0.5	10	16	62	–	–	1V	55
S1VB80				800											
S1VBA60			50	600									Large IFSM		
D2SBA60	1.5	25*1	60	600	-40 to 150	150	1.05	0.75	10	10	47	–	–	2S	56
D2SB60			80												
D2SB60A	2	115*2	120	600	-40 to 150	150	0.95	1	10	10	47	–	–	2S	56
UD2KB80		143	62	800	-55 to 150		1.05			15	55	1.5	UL®	D3K	54
UD3KB80	3	140	90	800	-55 to 150	150	1.05	1.5	10	15	55	1.5	UL®	D3K	54
D3SBA60	4	108	80	600	-40 to 150	150	1.05	2	10	6	30	5.5	UL®	3S	57
D3SB60			120												
D3SB80				800											
D4SB60L		111	150	600			0.95								
D4SB80		108		800											
UD4KB80		138	135	800	-55 to 150		1.00			15	55	1.5	UL®	D3K	54
D5SBA60	6	111	120	600	-40 to 150	150	1.05	3	10	5	26	3.4	UL®	5S	58
D5SB60		110	170										UL®		
D5SB80				800									Large IFSM		
D6SB60L		112		600									UL®		
D6SB80		110		800											
UD6KBA80		131	135	800	-55 to 150					15	55	1.5	UL®	D3K	54
D6JBB60V			100	600						6.5	40	1.5	UL®	JB	75
D6JBB80V				800									UL®		
UD8KBA80	8	126	165	800	-55 to 150	150	1.05	4	10	15	55	1.5	UL®	D3K	54
D8JBB60V		130	130	600						6.5	40	1.2	UL®	JB	75
D8JBB80V				800									UL®		
D10XB60	10	100	120	600	-40 to 150	150	1.1	5	10	6	26	2.3	UL®	3S	57
D10XB80				800											
D10XB60H		112	170	600			1.05					1.9	UL® Large IFSM		
D10JBB60V		129	150	600	-55 to 150			5	10	6.5	40	1	UL®	JB	75
D10JBB80V				800									UL®		
D15JAB60V	15	110	200	600	-55 to 150	150	1.05	7.5	10	5	30	1.2	UL®	JA	72
D15JAB80V				800									UL®		
D15XB60		100		600	-40 to 150		1.1				22	1.5	UL®	5S	58
D15XB80				800											
D15XB100		110		1000	-55 to 150						23	1.2			
D15XB60H		107	240	600	-40 to 150		1.05				22	1.5	UL® Large IFSM		
D20XB60	20	87	240	600	-40 to 150	150	1.1	10	10	5	22	1.5	UL®	5S	58
D20XB80				800											
D25JAB60V	25	107	350	600	-55 to 150	150	1.05	12.5	10	5	30	0.8	UL®	JA	72
D25JAB80V				800									UL®		
D25XB60		98		600	-40 to 150						22	1	UL®	5S	58
D25XB80				800											
D25XB100		106		1000	-55 to 150						23	0.8			
D50XB80	50	95	600	800	-40 to 150	150	1.05	25	10	–	16	0.5	UL®	TSB (4pin)	59

*1 : Ta *2 : Tl

UL® : UL recognized (UL File No. E142422)

BRIDGE DIODES

Low frequency rectifying

Small Bridge Diodes


1Z(SMD)


1Z(DIP)


1N/1NA(SMD)


1N/1NA(DIP)


1W(SMD)


1W(DIP)


SOPA-4


1Y(DIP)

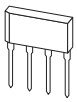
Type No.	Absolute Maximum Ratings						Electrical Characteristics					Remarks	Outline	
	Io [A]	Conditions Ta [°C]	IFSM [A]	VRM [V]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	θjl (max) [°C/W]	θja (max) [°C/W]		Package	Fig.
S1YB60	0.4	40	30	600	-40 to 150	150	1.05	0.2	10	20	150	–	1Y	22-1
S1ZB60	0.8	25	30	600	-40 to 150	150	1.05	0.4	10	20	76	–	1Z	23-1 or 24
S1ZB80				800										
D1UBA80	1	25	30	800	-55 to 150	150	0.95	0.4	10	25	62.5	–	SOPA-4	33
S1NB60				600	-40 to 150		1.05	0.5		15	68		1N	25 or 26
S1NB80				800										
S1NBB80		26	50	800									1NA	27-1 or 28
S1WB(A)60		25	30	600			1.0			10	65		1W	29 or 30
S1WB(A)80				800										
S1WB(A)60B			50	600								Large IFSM		
S1NBC60	1.5	105*1	60	600	-55 to 150	150	1.05	0.75	10	15	68	Large IFSM	1NA	27-1 or 28
S1NBC80				800										

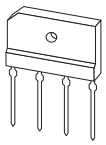
*1 : Tl

Low Noise Bridge Diodes


1W(DIP)


1W(SMD)


1V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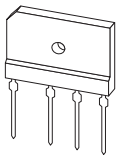
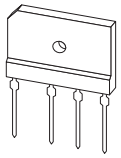

5S

Type No.	Absolute Maximum Ratings						Electrical Characteristics							Remarks	Outline	
	Io [A]	Conditions Tc [°C]	IFSM [A]	VRM [V]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	trr (max) [μs]	θjl (max) [°C/W]	θja (max) [°C/W]	θjc (max) [°C/W]		Package	Fig.
LN1WBA60	1.1	25*1	50	600	-40 to 150	150	1.0	0.55	10	5	10	65	–	–	1W	29 or 30
LN1VB60	1.2							0.6			16	62			1V	55
LN4SB60	4	111	150				0.95	2			6	30	5.5	UL	3S	57
LN6SB60	6		170				1.05	3			5	26	3.4		5S	58
LN15XB60	15	100	200		-55 to 150		1.1	7.5				23	1.5	–		
LN15XB60H		106	290				1.05							Large IFSM		
LN25XB60	25	85	350					12.5					1.3	–		

*1 : Ta

UL : UL recognized (UL File No. E142422)

Low V_F Bridge Diodes

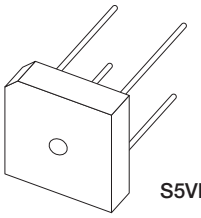

5S

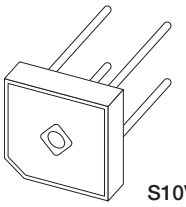
Type No.	Absolute Maximum Ratings								Electrical Characteristics								Remarks	Outline	
	Io [A]	Conditions Tc [°C]	IFSM [A]	IFSM1* [A]	I²t [A]	VRM [V]	Tstg [°C]	Tj [°C]	VF (max) [V]	VF (typ) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	trr (max) [μs]	θjl (max) [°C/W]	θja (max) [°C/W]	θjc (max) [°C/W]		Package	Fig.
LL15XB60	15	124	200	630	200	600	-55 to 150	150	0.90	0.86	7.5	10	3	5	25	1	UL	5S	58
LL25XB60	25	113	300	945	450				0.92	0.87	12.5					0.8			

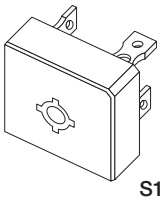
* : IFSM1: Pulse width 1ms

UL : UL recognized (UL File No. E142422)

SQIP(Square IN-line Package) Bridge Diodes


S5VB

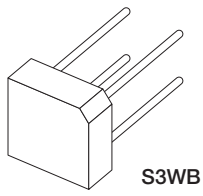

S10VB

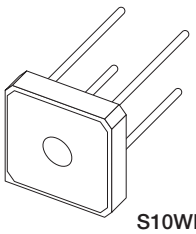

S15VB

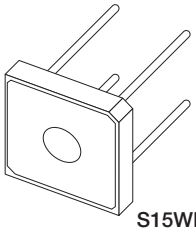
Type No.	Absolute Maximum Ratings						Electrical Characteristics					Outline	
	Io [A]	Conditions Ta [°C]	IFSM [A]	VRM [V]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	θj-l (max) [°C/W]	θjc (max) [°C/W]	Package	Fig.
S2VB60	2	40	40	600	-40 to 150	150	1.05	1	10	7	–	S2VB	61
S4VB60	4*1		80					2		4.5		S4VB	62
S5VB60	6*1		200					3		3		S5VB	63
S10VB60	10*1							5		2.8		S10VB	64
S15VB60	15*1	83*2						7.5		–	2.3	S15VB	65
S25VB60	25*1	85*2	400	600				12.5			1.5	S25VB	66
S25VB80				800									
S50VB60	50*1	95*2	500	600				25			0.5	S50VB	67
S50VB80				800									

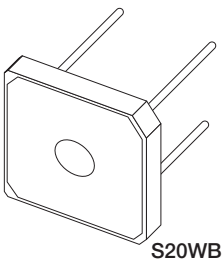
*1: With heatsink *2 : Tc

Input/Output In-line Terminal Type


S3WB


S10WB


S15WB


S20WB

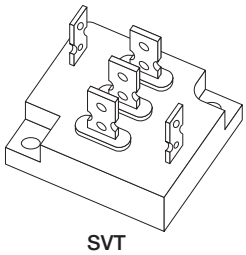
Type No.	Absolute Maximum Ratings						Electrical Characteristics					Outline	
	Io [A]	Conditions Tc [°C]	IFSM [A]	VRM [V]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	θj-l (max) [°C/W]	θjc (max) [°C/W]	Package	Fig.
S3WB60	2.3	40*	120	600	-40 to 150	150	1.05	2	10	5.5	–	S3WB	68
S10WB60	10	74	170					5		4	3.9	S10WB	69
S15WB60	15	77	200					7.5		2	2.5	S15WB	70
S20WB60	20	76	500					10			2	S20WB	71
S20WB80				800									

* : Ta

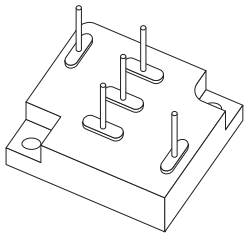
BRIDGE DIODES

High frequency rectifying

3 Phase Bridge Diode Modules



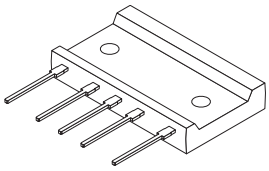
SVT



SVTA

Type No.	Absolute Maximum Ratings						Electrical Characteristics				Outline	
	Io [A]	Conditions Tc [°C]	IFSM [A]	VRM [V]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	θjc (max) [°C/W]	Package	Fig.
S10VT60	10	137	170	600	-40 to 150	150	1.05	3.5	10	0.65	SVT	74
S10VTA60											SVTA	73
S10VT80			150	800							SVT	74
S10VTA80											SVTA	73
S15VT60	15	132	200	600				5		0.6	SVT	74
S15VTA60											SVTA	73
S15VT80				800							SVT	74
S15VTA80											SVTA	73
S20VT60	20	128	300	600				7		0.55	SVT	74
S20VTA60											SVTA	73
S20VT80				800							SVT	74
S20VTA80											SVTA	73
S30VT60	30	121	400	600				10		0.5	SVT	74
S30VTA60											SVTA	73
S30VT80				800							SVT	74
S30VTA80											SVTA	73
S30VTA160		116	350	1600					100		SVTA	73

3 Phase SIP Bridge Diodes



TSB (5pin)

Type No.	Absolute Maximum Ratings						Electrical Characteristics					Remarks	Outline	
	Io [A]	Conditions Tc [°C]	IFSM [A]	VRM [V]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	θja (max) [°C/W]	θjc (max) [°C/W]		Package	Fig.
D30XT80	30	117	300	800	-40 to 150	150	1.05	10	10	16	0.5	UL	TSB (5pin)	60
D45XT80	45	101	400					15						
D45XT160		97	330	1600					100					

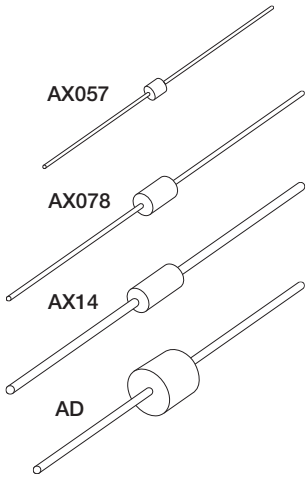
UL : UL recognized (UL File No. E142422)

SCHOTTKY BARRIER DIODES

High frequency rectifying

Single

Axial



Type No.	Absolute Maximum Ratings						Electrical Characteristics						Outline		
	VRM [V]	Io [A]	Conditions Ta [°C]	IFSM [A]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [mA]	Cj (typ) [pF]	θjl (max) [°C/W]	θja (max) [°C/W]	Package	Color Code	Fig.
D1NS4	40	1	59	30	-55 to 150	150	0.55	1	0.8	50	10	113	AX057	Silver	1
D2S4M		2	122*1	60	-40 to 150			2	2	95	17	105	AX078		5-1
D3S4M		3	63	80				3	3.5	150	6.5	36	AX14		8
☆D15AD4SJE	40	15	97*1	200	-55 to 150	150	0.61	15	0.7	560	5	55	AD	Silver	9
D1NS6	60	1	46	30	-55 to 150	150	0.58	1	1	53	10	113	AX057	Silver	1
D2S6M		2	119*1	60	-40 to 150			2	2	90	17	105	AX078	Blue	5-1
D3S6M		3	133*1	80				3	2.5	130	6.5	62	AX14		8

☆ : New product　　*1 : Tl

Surface Mount

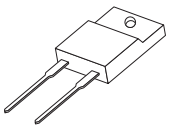
Type No.	Absolute Maximum Ratings						Electrical Characteristics							Outline	
	VRM [V]	Io [A]	Conditions Tc [°C]	IFSM [A]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [mA]	Cj (typ) [pF]	θjl (max) [°C/W]	θja (max) [°C/W]	θjc (max) [°C/W]	Package	Fig.
M1FP3	30	1.29	25*2	30	-55 to 125	125	0.40	1.1	2.5	90	20	108	–	M1F	12
M1FH3		1.5	105				0.36	1.5	1.0	80		80	18		
D1FP3		2	98*1	60			0.40	2	4.5	130	23	108	–	1F	13-1
D1FH3		3	95				0.36	3	2.0		18	65	16		
D3FP3			74*1	150			0.40	4	10	300	24	90	–	2F	16-1
M1FM3			100	30	-55 to 150	150	0.46	1.5	0.05	80	20	80	18	M1F	12
D1FM3		5	83	90				3	0.1	130	18	65	16	1F	13-1
M2FH3		6	70	110	-55 to 125	125	0.36	6	4	240	16	55	14	M2F	15-1
M2FM3			99	120	-55 to 150	150	0.46		0.2						
DE10P3		10	95	200	-55 to 125	125	0.40	8	25	600	–	–	4	E-pack	31-4
DE10S3L			124	250	-55 to 150	150	0.45		10	640					
D1FS4	40	1.1	51*2	30	-55 to 150	150	0.55	1.1	1	65	23	108	–	1F	13-1
M1FS4		1.33	25*2						0.8	50	20			M1F	12
M1FJ4		1.5	31*2				0.57	1	0.05	65					
D1FS4A			28*2	60			0.45	1.1	2	95	23			1F	13-1
D2FS4		1.6	34*2				0.55	1.6	2.5	150	24	90		2F	16-1
D1FJ4		2	117*1	50			0.57	1.5	0.2	96	23	108		1F	13-1
D3FS4A		2.6	34*2	150			0.45	2.6	5	340		80		2F	16-1
DE3S4M		3	121	70	-40 to 150		0.55	3	2.5	150	–	55	12	E-pack	31-2
DE5S4M		5	101	80				5	3.5	180					
D1FS6	60	1.1	25*2	40	-55 to 150	150	0.58	1.1	1	50	23	108	–	1F	13-1
M1FS6		1.2								53	20			M1F	12
D2FS6		1.5	31*2	60	-40 to 150			2	2	120	24	90		2F	16-1
☆D1FS6A		2.5	103		-55 to 150		0.57	2.5	0.2	80	23	108		1F	13-1
D3FS6		3	87*1	80	-55 to 150		0.58	3	2.5	130	24	90		2F	16-1
DE3S6M			117		-40 to 150						–	55	12	E-pack	31-2
DE5S6M		5	96	90	-40 to 150			5	4.5	200					
☆D1FJ8	80	2	110	30	-55 to 150	150	0.74	1.5	0.2	40	–	65	16	1F	13-1
☆D1FJ8A		3	100					3	0.4	70					
D1FJ10	100	1	52*2	50	-55 to 150	150	0.72	1	0.2	63	23	108	–	1F	13-1
D3FJ10		3	92*1	100			0.74	3	0.4	143		115		2F	16-1
☆D1FT10A			116*1	60	-55 to 175	175	0.75	1	8μA	60		108		1F	13-1

☆ : New product　　*1 : Tl　　*2 : Ta

SCHOTTKY BARRIER DIODES

High frequency rectifying

Two Terminal Type



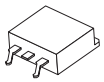
FTO-220G

Type No.	Absolute Maximum Ratings						Electrical Characteristics					Outline	
	V_{RM} [V]	Io [A]	Conditions Tc [°C]	I_{FSM} [A]	Tstg [°C]	Tj [°C]	V_F (max) [V]	Conditions I_F [A]	I_R (max) $V_R=V_{RM}$ [mA]	Cj (typ) [pF]	θjc (max) [°C/W]	Package	Fig.
SG5S4M	40	5	131	150	-55 to 150	150	0.52	5	0.5	157	5.0	FTO-220G	52A
SG5S6M	60		130	120			0.56			165			
SG5S9M	90		124	90			0.75			140			

Center Tap, Common Cathode

Surface Mount

E-pack
FE

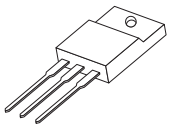


STO-220

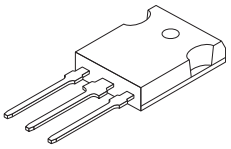
Type No.	Absolute Maximum Ratings						Electrical Characteristics					Outline	
	V_{RM} [V]	Io [A]	Conditions Tc [°C]	I_{FSM} [A]	Tstg [°C]	Tj [°C]	V_F (max) [V]	Conditions I_F [A]	I_R (max) $V_R=V_{RM}$ [mA]	Cj (typ) [pF]	θjc (max) [°C/W]	Package	Fig.
DE5PC3	30	5	90	90	-55 to 125	125	0.4	2.5	6	180	12	E-pack	31-1
DE5SC3ML			110		-55 to 150	150	0.45		3.5	190			
DE10PC3		10	97	80	-55 to 125	125	0.4	4	10	290	4		
DE10SC3L			124	100	-55 to 150	150	0.45		5				
DF20PC3M		20	105	200	-55 to 125	125	0.4	8	35	560	1.6	STO-220	36-1
DF30PC3M		30	97	300				10	50	840			
DF30SC3ML			119	350	-55 to 150	150	0.45	12.5	10	820			
DF40PC3		40	105		-55 to 125	125	0.4	15	45	1160	0.8		
DF40SC3L			112	400	-55 to 150	150	0.45		17	1200	1.5		
DE5SC4M	40	5	101	80	-40 to 150	150	0.55	2.5	3.5	150	12	E-pack	31-1
DE10SC4		10	132	100	-55 to 150			5		210	4		
DF10SC4M			125		-40 to 150					180	3	STO-220	36-1
DF15SC4M		15	129	150				7.5	5	340	1.7		
DF20SC4M		20	122	230				10	7.5	390			
DF30JC4		30	115	250	-55 to 150		0.61	15	0.7	560	1.6		
DF30SC4M			112	360	-40 to 150		0.55		10	590			
DF40SC4		40	106	350	-55 to 150			20	14	860	1.5		
DE5SC6M	60	5	92	80	-40 to 150	150	0.58	2.5	2.5	130	12	E-pack	31-1
DF10SC6		10	132	150	-55 to 150			5	4.5	260	2.0	STO-220	36-1
DF25SC6M		25	115	300	-40 to 150			12.5	10	490	1.6		
DF30JC6		30	108	250	-55 to 150		0.69	15	0.7				
DF10SC9	90	10	131	150	-55 to 150	150	0.75	5	3	185	1.2		
DF20SC9M		20	111	200	-40 to 150			10	10	370	1.6		
D6FEC10ST	100	6	154	100	-55 to 175	175	0.86	3	8μA	60	4	FE	100
DF15JC10		15	126	150	-55 to 150	150		7.5	0.6	200	1.8	STO-220	36-1
DF20JC10		20	121	200				10	0.7	260	1.6		
DF30JC10		30	116	300				15	1.0	390	1.3		
D6FEC12ST	120	6	154	100	-55 to 175	175	0.87	3	8μA	60	4	FE	100
D6FEC15ST	150	6	154	100	-55 to 175	175	0.88	3	8μA	52	4	FE	100
DF10NC15		10	123	100	-55 to 150	150		5	0.2	110	3.0	STO-220	36-1
DF15NC15		15	126	150				7.5	0.3	155	1.8		
DF20NC15		20	121	200				10	0.4	200	1.6		
DF30NC15		30	115	300				15	0.5	300	1.3		

Center-tap 

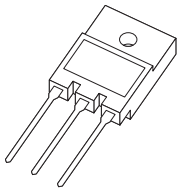
Three Terminal Type



FTO-220G



MTO-3PT
MTO-3PV



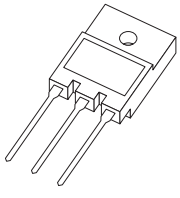
ITO-3P

Type No.	Absolute Maximum Ratings						Electrical Characteristics					Outline	
	VRM [V]	Io [A]	Conditions Tc [°C]	IFSM [A]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [mA]	Cj (typ) [pF]	θjc (max) [°C/W]	Package	Fig.
☆S40HC1R5T	15	40	111	450	-55 to 125	125	0.41	20	10	960	0.6	MTO-3PT	96-2
☆S60HC1R5T		60	110	600				30	15	1400	0.4		
☆SG10SC3LM	30	10	136	150	-55 to 150	150	0.45	4	5	310	3	FTO-220G	52
☆SG20SC3LM		20	124	250				8	9	570	2		
☆SG30SC3LM		30	117	350				12.5	15	960	1.7		
☆S60HC3T		60	112	650	-55 to 125	125	0.40	30	20	1100	0.3	MTO-3PT	96-2
☆S60SC3LT			138		-55 to 150	150	0.48		25	1600			
SG8SC4M	40	8	155	80	-55 to 175	175	0.56	4	0.3	100	3.3	FTO-220G	52
SG10SC4M		10	150	150			0.52	5	0.5	157	3.0		
SG15SC4M		15	117		-55 to 150	150		7.5	0.8	230			
SG20SC4M		20	115	200				10	1.1	315	2.4		
S30SC4MT		30	132	300			0.55	15	1.5	410	0.8	MTO-3PT	96-2
D30SC4M			112		-40 to 150				10	590	1.6	ITO-3P	44-1
SG30SC4M			101		-55 to 150				1.5	415	2.2	FTO-220G	52
S60SC4MT		60	127	500				30	3	790	0.5	MTO-3PT	96-2
SG10SC6M	60	10	145	140	-55 to 175	175	0.56	5	0.5	165	3.0	FTO-220G	52
SG15SC6M		15	113	180	-55 to 150	150	0.61	7.5	0.6	185			
SG20JC6M		20	106	200	-55 to 150		0.69	10	0.1	250	2.4		
SG20SC6M			107				0.61		0.8		2.5		
D25SC6M		25	117	300	-40 to 150		0.58	12.5	10	490	1.5	ITO-3P	44-1
SG30JC6M		30	90	250	-55 to 150		0.69	15	0.15	325	2.2	FTO-220G	52
SG30SC6M			100	300			0.61		1.2	385	2.0		
S30SC6MT			129								0.8	MTO-3PT	96-2
S60SC6MT		60	121	470			0.67	30	2	640	0.5		
SG10SC9M	90	10	139	150	-55 to 175	175	0.75	5	0.5	140	3.0	FTO-220G	52
SG20SC9M		20	112	200	-55 to 150	150		10	1	245	2.2	FTO-220G	52
S20SC9MT			136								0.8	MTO-3PT	96-2
SG20TC10M	100	20	140	200	-55 to 175	175	0.86	10	0.03	185	2.2	FTO-220G	52
SG30TC10M		30	126	300				15	0.04	242	2.0		
SG40TC10M		40	116	350				20	0.06	362	1.8		
SG40SC10U			67	250	-55 to 150	150	0.75		1	170			
S60JC10V		60	118	500			0.95	30	0.2	695	0.5	MTO-3PV	98
SG20TC12M	120	20	137	200	-55 to 175	175	0.87	10	0.03	175	2.2	FTO-220G	52
SG30TC12M		30	122	300				15	0.04	228	2.0		
SG40TC12M		40	112	350				20	0.06	336	1.8		
SG10TC15M	150	10	153	120	-55 to 175	175	0.88	5	0.015	92	2.5		
SG20TC15M		20	136	200				10	0.03	159	2.2		
SG30TC15M		30	122	300				15	0.04	209	2.0		
☆S30TC15T			128		-55 to 150	150					0.8	MTO-3PT	96-2

☆: New product Center-tap 

Center Tap, Common Anode

Three Terminal Type



ITO-3P

Type No.	Absolute Maximum Ratings						Electrical Characteristics					Outline	
	VRM [V]	Io [A]	Conditions Tc [°C]	IFSM [A]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [mA]	Cj (typ) [pF]	θjc (max) [°C/W]	Package	Fig.
D25SC6MR	60	25	117	300	-40 to 150	150	0.58	12.5	10	490	1.5	ITO-3P	44-2

Center-tap(R) 

SCHOTTKY BARRIER DIODES

High frequency rectifying

Array

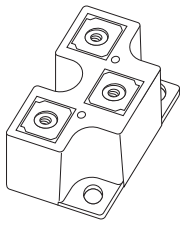
Surface Mount

1Z

Type No.	Absolute Maximum Ratings						Electrical Characteristics						Outline	
	VRM [V]	Io [A]	Conditions Ta [°C]	IFSM [A]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [mA]	Cj (typ) [pF]	θjl (max) [°C/W]	θja (max) [°C/W]	Package	Fig.
S1ZAS4	40	1.2	49	40	-40 to 150	150	0.55	1	1	65	25	93	1Z	23-2

Array 

Diode Modules



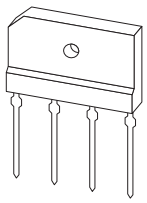
Module

Type No.	Absolute Maximum Ratings						Electrical Characteristics					Remarks	Outline	
	VRM [V]	Io [A]	Conditions Tc [°C]	IFSM [A]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [mA]	Cj (typ) [nF]	θjc (max) [°C/W]		Package	Fig.
D120SC4M	40	120	90	800	-40 to 125	125	0.58	60	40	2.1	0.34	∗1	Module	77
D180SC4M		180	83								0.25	∗2		79-1
D240SC4M		240	77	1600			0.60	120	80	4.2	0.23	∗1		77
D360SC4M		360	64								0.18	∗2		79-1
D120SC6M	60	120	85	800			0.67	60	40	2.2	0.34	∗1	Module	77
D180SC6M		180	78								0.25	∗2		79-1
D240SC6M		240	71	1600				120	80	4.4	0.23	∗1		77
D360SC6M		360	58								0.18	∗2		79-1

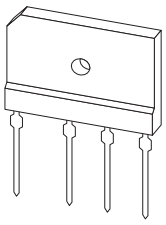
∗1 

∗2 

Bridge Diodes



3S



5S

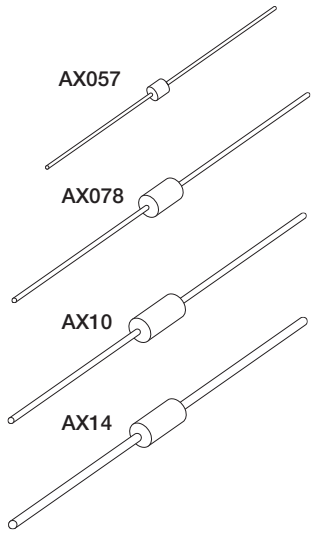
Type No.	Absolute Maximum Ratings						Electrical Characteristics					Outline	
	VRM [V]	Io [A]	Conditions Tc [°C]	IFSM [A]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [mA]	Cj (typ) [pF]	θjc (max) [°C/W]	Package	Fig.
D4SBS4	40	4	116	60	-55 to 150	150	0.55	2	2	95	5.5	3S	57
D10SBS4		10	67	100				5	3.5	180			
D4SBS6	60	4	114	60	-40 to 150		0.62	2	2				
D15XBS6		15	59	150	-55 to 150		0.63	7.5	6	410	3.5		
D20XBS6		20	100	200				10	8	370	1.5	5S	58
D4SBN20	200	4	103	60			0.9	2	7.5μA	60	6	3S	57
D6SBN20		6	110	120				3	2μA	85	3.4	5S	58
D15XBN20		15	106	200				7.5	5μA	190	1.5		
D30XBN20		30	91	350				15	10μA	360	1		

FAST RECOVERY DIODES

High frequency rectifying

Single

Axial



Type No.	Absolute Maximum Ratings						Electrical Characteristics						Outline		
	VRM [V]	Io [A]	Conditions Ta [°C]	IFSM [A]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	trr (max) [ns]	θjl (max) [°C/W]	θja (max) [°C/W]	Package	Color Code	Fig.
D1NL20U	200	1	25	25	-55 to 150	150	0.98	1	10	35	10	113	AX057	Silver	1
D2L20U		1.5	125*1	40	-40 to 150			1.5			17	105	AX078	Red	5-1
S2L20U			25	50							12	83	AX10		6-1
S3L20U		3	128*1	60				2.1			6.5	60	AX14		8
D1NL40U	400	1	137*1	50	-55 to 150	150	1.25	1	10	25	10	113	AX057	Silver	1
D2L40U		2	108*1	80				2		35	17	105	AX078	Yellow	5-1
S2L40U			120*1	100							12	83	AX10		6-1
S3L40U		3	126*1	150				3			6.5	60	AX14		8
D1NF60	600	0.8	25	50	-55 to 150	150	1.3	0.8	10	400	10	113	AX057	Silver	1
D1NK60			26	35						75					
S2L60		1.5	125*1	50			1.5	1.5		50	12	83	AX10	Blue	6-1
S3L60		2.2	132*1	60				2.2		50	6.5	60	AX14		8
S3K60		3	123*1	120			1.3	3		100					
☆D1NK100	1000	1	127*1	30	-55 to 150	150	2.1	1	10	75	10	113	AX057	Silver	1
☆S2K100		2	91*1	65				2			12	83	AX10		6-1

☆: New product　　*1 : Tl

Surface Mount

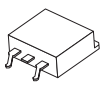

M1F


1F


M2F


2F

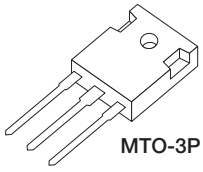

E-pack


STO-220

Type No.	Absolute Maximum Ratings						Electrical Characteristics							Outline	
	VRM [V]	Io [A]	Conditions Tc [°C]	IFSM [A]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	trr (max) [ns]	θjl (max) [°C/W]	θja (max) [°C/W]	θjc (max) [°C/W]	Package	Fig.
M1FL20U	200	1.1	25*1	30	-55 to 150	150	0.98	1.1	10	35	20	108	–	M1F	12
D1FL20U				20							23			1F	13-1
M2FL20U		1.5	31*1	50			0.92	1.5			33	90		M2F	15-1
D2FL20U			25*1				0.98				24			2F	16-1
M3FL20U		3	75*2	75			0.95	3			25	110		M2F	15-1
DE3L20UA			137	60			0.98				–	55	4	E-pack	31-5
D2FL40	400	1.3	25*1	40	-40 to 150	150	1.3	1.3	10	50	24	90	–	2F	16-1
D1FL40U		1.5	103*2	30	-55 to 150		1.2	1		25	23	157		1F	13-1
M1FL40U			139		-55 to 175	175					20	108	18	M1F	12
DE3L40A		3	132	60	-55 to 150	150	1.3	3		50	–	55	4	E-pack	31-5
D1FK60	600	0.8	29*1	20	-55 to 150	150	1.3	0.8	10	75	23	108	–	1F	13-1
D2FK60		1.5	101*2	40				1.5			24	90		2F	16-1
D3FK60		2.1	93*2	120			1.2	2.1		100	23	80			
DE5L60		5	57	60			2	5		50	–	–	12	E-pack	31-5
DE5L60U			91				3		25	25			4		
DF8L60US		8	66				3.6	8	50				2.3	STO-220	36-2
DF10L60		10	105	100			1.9	10	10	50			2		
DF20L60		20	84	170				20	25	70			1.5		
DF20L60U			93	160			3			35			0.9		
D1FK70	700	0.8	32*1	25	-55 to 150	150	1.3	0.8	10	400	23	108	–	1F	13-1

*1 : Ta　　*2 : Tl

Three Terminal Type

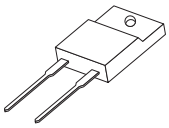

MTO-3P

Type No.	Absolute Maximum Ratings						Electrical Characteristics					Outline	
	VRM [V]	Io [A]	Conditions Tc [°C]	IFSM [A]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	trr (max) [ns]	θjc (max) [°C/W]	Package	Fig.
S60L120D	1200	60	54	450	-55 to 150	150	2.7	60	100	300	0.55	MTO-3P	46-3

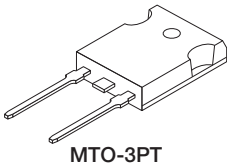
FAST RECOVERY DIODES

High frequency rectifying

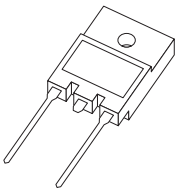
Two Terminal Type



FTO-220
FTO-220AG



MTO-3PT



ITO-3P

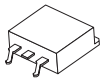
Type No.	Absolute Maximum Ratings						Electrical Characteristics					Outline	
	VRM [V]	Io [A]	Conditions Tc [°C]	IFSM [A]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	trr (max) [ns]	θjc (max) [°C/W]	Package	Fig.
SG5L20USM	200	5	125	90	-55 to 150	150	0.96	5	10	25	5	FTO-220G	52A
SG10L20USM		10	101	200				10					
SF5L40UM	400	5	121	100			1.25	5	10	30	4.5	FTO-220AG	51
SF3L60U	600	3	115	40			3	3	25	20	3.8	FTO-220	47
SF3K60M			132	90			1.45		10	80	3.5	FTO-220AG	51
SF5K60M		5	119	120			1.5	5		85			
SF5L60U			96	60			3		25	25	3.6	FTO-220	47
SF8K60M		8	108	150			1.5	8	10	90	3.0	FTO-220AG	51
☆SF8K60USM			170	60			3.6		50	25	2.6		
SF10K60M		10	106	180			1.5	10	10	95	2.5	FTO-220AG	51
SF10L60U			85	120			3		25	25	2.0	FTO-220	47
SF20L60U		20	68	180			3	20	25	35	1.3	FTO-220	47
SF20K60M			96	240			1.5		10	95	1.5	FTO-220AG	51
S20K60T			121	300							0.8	MTO-3PT	95
S30K60T		30	123	450			1.5	30	10	100	0.8	MTO-3PT	95
D30L60			85	600					25	150	1.4	ITO-3P	43

☆: New product

Center Tap, Common Cathode

Surface Mount

E-pack

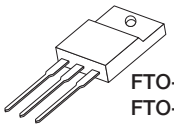


STO-220

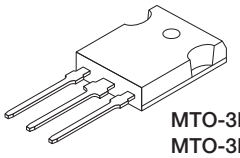
Type No.	Absolute Maximum Ratings						Electrical Characteristics						Outline	
	VRM [V]	Io [A]	Conditions Tc [°C]	IFSM [A]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	trr (max) [ns]	θja (max) [°C/W]	θjc (max) [°C/W]	Package	Fig.
DE5LC20U	200	5	81	50	-55 to 150	150	0.98	2.5	10	35	55	12	E-pack	31-1
DF10LC20U		10	127	80	-40 to 150			5			–	2	STO-220	36-1
DF20LC20US		20	125	180	-55 to 150		0.96	10		25		1.3		
DF10LC30	300	10	124	80	-55 to 150	150	1.3	5	25	30	–	2		
DF20LC30		20		180				10				1		
DE5LC40	400	5	61	50	-55 to 150	150	1.3	2.5	10	50	55	12	E-pack	31-1

Center-tap 

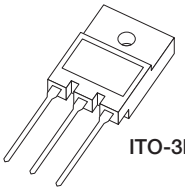
Three Terminal Type



FTO-220G
FTO-220AG



MTO-3PT
MTO-3PV



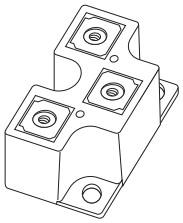
ITO-3P

Type No.	Absolute Maximum Ratings						Electrical Characteristics					Outline	
	VRM [V]	Io [A]	Conditions Tc [°C]	IFSM [A]	Tstg [°C]	Tj [°C]	VF (max) [V]	Conditions IF [A]	IR (max) VR=VRM [μA]	trr (max) [ns]	θjc (max) [°C/W]	Package	Fig.
SG5LC20USM	200	5	133	70	-55 to 150	150	0.96	2.5	10	25	3.3	FTO-220G	52
SG10LC20USM		10	122	90				5			2.8		
SG20LC20USM		20	95	150				10					
S20LC20UST			126	120							1.2	MTO-3PT	96-2
D20LC20U			112	150	-40 to 150		0.98			35	1.7	ITO-3P	44-1
☆S20LC30T	300	20	124	220	-55 to 150	150	1.3	10	25	30	1.0	MTO-3PT	96-2
☆SF20LC30M			107	250						25	1.7	FTO-220AG	51A-1
SF5LC40UM	400	5	132	80	-55 to 150	150	1.25	2.5	10	30	2.8	FTO-220AG	51A-1
SF10LC40UM		10	120	100				5			2.3		
S20LC40UT		20	123	130				10			1.0	MTO-3PT	96-2
D20LC40			102	120	-40 to 150		1.3			50	1.7	ITO-3P	44-1
SF10KC60M	600	10	109	120	-55 to 150	150	1.5	5	10	85	2.3	FTO-220AG	51A-1
SF20KC60M		20	97	180				10		95	1.5		
☆S20LC60UST			63	60			3.6		50	25	1.0	MTO-3PT	96-2
S20LC60USV			65									MTO-3PV	98

☆: New product

Center-tap 

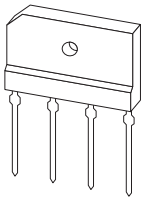
Diode Modules



Module

Type No.	Absolute Maximum Ratings						Electrical Characteristics					Outline	
	V_{RM} [V]	I_O [A]	Conditions Tc [°C]	I_{FSM} [A]	Tstg [°C]	Tj [°C]	V_F (max) [V]	Conditions I_F [A]	I_R (max) $V_R=V_{RM}$ [μA]	trr (max) [ns]	θjc (max) [°C/W]	Package	Fig.
D120LC40	400	120	95	650	-40 to 150	150	1.3	60	25	100	0.31	Module	79-2
D120LC40B			60								0.5		78
D200LC40B		200	52	1400				100	50	150	0.35		
D240LC40		240	77					120			0.2		79-2

Bridge Diodes



3S

Type No.	Absolute Maximum Ratings						Electrical Characteristics							Outline	
	V_{RM} [V]	I_O [A]	Conditions Tc [°C]	I_{FSM} [A]	Tstg [°C]	Tj [°C]	V_F (max) [V]	Conditions I_F [A]	I_R (max) $V_R=V_{RM}$ [μA]	trr (max) [ns]	θjl (max) [°C/W]	θja (max) [°C/W]	θjc (max) [°C/W]	Package	Fig.
D4SBL20U	200	4	108	80	-55 to 150	150	0.98	2	10	35	6	30	5.5	3S	57
D4SBL40	400		91	50			1.3	2.5		50					

SIDAC (Silicon Diode for Alternating Current)

SIDAC (Bi-Directional Device)

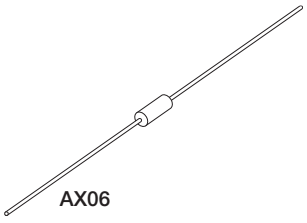
■ **Features**

1. Symmetrical characteristics.
2. Operating directly from the AC mains, and can be used in all kinds of pulse generating circuits.
3. The glass passivation ensures high reliability.

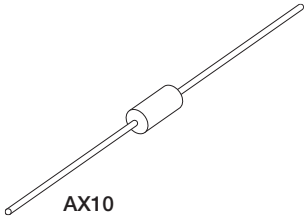
■ **Applications**

1. Pulse generation: gas igniters, HID(high intensity discharge) lamp drive circuit, etc.
2. AC switching: drive circuit for switching power supplies, voltage detecting circuits, etc.
3. Over voltage protection: AC line surge protection, capacitor rupture prevention, etc.

Axial



AX06



AX10

Type No.	Absolute Maximum Ratings									Electrical Characteristics									Outline	
	V_{DRM} [V]	I_T [A]	Conditions T_l [°C]	I_{TSM} [A]	I_{TRM} [A]	Conditions f [Hz]	di_T/dt [A/μs]	Tstg [°C]	Tj [°C]	V_{BO} [V]	I_{DRM} (max) [μA]	Conditions V_D [V]	I_{BO} (max) [mA]	I_H (typ) [mA]	V_T (max) [V]	Conditions I_T [A]	R_S (min) [kΩ]	$\theta j l$ (max) [°C/W]	Package	Fig.
K1V(A)10	90	1	109	16	60	60	50	-40 to 125	125	95 to 113	10	90	0.5	50	1.6	1	0.1	20	AX06	2-1
K1V(A)11										104 to 118										
K1V(A)12										110 to 125										
K1V(A)16	115	1	98	16	60	60	50	-40 to 125	125	145 to 170	10	115	0.5	50	1.6	1	0.1	20		
K1V5	40	1	107	13	80	60	80	-40 to 125	125	45 to 60	10	40	0.5	50	1.5	1	0.1	15	AX10	6-3
K1V6										55 to 65										
K1V10	90	1	112	20	80	60	80	-40 to 125	125	95 to 113	10	90	0.5	50	1.5	1	0.1	15		
K1V11										104 to 118										
K1V12										110 to 125										
K1V14	115	1	109	20	80	60	80	-40 to 125	125	125 to 150	10	115	0.5	30	1.5	1	0.1	15		
K1V22	180	1	108	20	50	60	80	-40 to 125	125	200 to 230	10	180	0.5	20	1.5	1	0.1	15		
K1V24										220 to 250										
K1V26										240 to 270										
K1V22(W)	180	1	91	16	50	60	80	-40 to 125	125	200 to 230	10	180	0.5	50	3	1	0.1	15	AX10	7
K1V24(W)										220 to 250										
K1V26(W)										240 to 265										
K1V36(W)	270	1	92	13	40	60	50	-40 to 125	125	340 to 380	10	270	0.5	50	3	1	0.1	15		
K1V38(W)							80			360 to 400										

Surface Mount

1F

Type No.	Absolute Maximum Ratings					Electrical Characteristics							Outline	
	V_{DRM} [V]	I_T [A]	Conditions T_l [°C]	Tstg [°C]	Tj [°C]	$V_{BO(A)}$ [V]	I_{DRM} (max) [μA]	Conditions V_D [V]	I_{BO} (max) [mA]	I_H (max) [mA]	V_T (max) [V]	Conditions I_T [A]	$\theta j l$ (max) [°C/W]	Package	Fig.
K1VZL09	5	0.5	110	-40 to 125	125	8 to 12	5	5	20	20	1.2	0.5	23	1F	14-3
K1VZL20	15	0.5	110	-40 to 125	125	18 to 22	5	15	20	20	1.2	0.5	23	1F	14-3

SIDAC (Uni-Directional Device)

■ **Features**
1. Uni-directional characteristics.
2. Smaller package than bi-directional SIDAC.
3. Switching operation from DC power for pulse generation.
4. The glass passivation ensures high reliability.

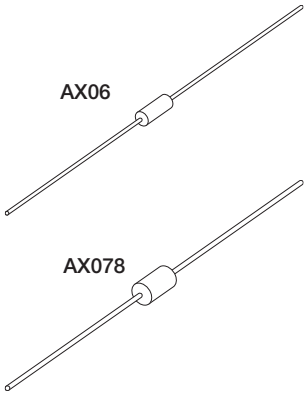
■ **Applications**
1. Pulse generation: gas igniters, negative ion generators, HID (high intensity discharge) lamp drive circuit, etc.
2. Over voltage protection: DC line surge protection.

Surface Mount

1F

Type No.	Absolute Maximum Ratings								Electrical Characteristics									Outline	
	$V_{DRM(A)}$ [V]	I_T [A]	Conditions T_l [°C]	I_{TRM} [A]	Conditions f [Hz]	di_T/dt [A/μs]	Tstg [°C]	Tj [°C]	$V_{BO(A)}$ [V]	$I_{DRM(A)}$ (max) [μA]	Conditions V_D [V]	$I_{BO(A)}$ (max) [mA]	$I_{H(A)}$ $I_{H(K)}$ (max) [mA]	$V_{T(A)}$ $V_{T(K)}$ (max) [V]	Conditions I_T [A]	$R_{S(A)}$ (min) [kΩ]	θjl (max) [°C/W]	Package	Fig.
G1VL8C	70	1	98	80	60	150	-40 to 125	125	75 to 90	10	70	1.0	100	1.5	1	0.1	23	1F	13-3
G1VL10C	90			150					95 to 110		90	0.5							
G1VL15C	120			120					142 to 157		120		60						
G1VL20C	170								190 to 210		170								
G1VL22C	190			280	5				210 to 230		190								
G1VL24C							-40 to 150	150	235 to 255										

Axial



Type No.	Absolute Maximum Ratings								Electrical Characteristics									Outline	
	$V_{DRM(A)}$ [V]	I_T [A]	Conditions T_l [°C]	I_{TRM} [A]	Conditions f [Hz]	di_T/dt [A/μs]	Tstg [°C]	Tj [°C]	$V_{BO(A)}$ [V]	$I_{DRM(A)}$ (max) [μA]	Conditions V_D [V]	$I_{BO(A)}$ (max) [mA]	$I_{H(A)}$ $I_{H(K)}$ (max) [mA]	$V_{T(A)}$ $V_{T(K)}$ (max) [V]	Conditions I_T [A]	$R_{S(A)}$ (min) [kΩ]	θjl (max) [°C/W]	Package	Fig.
G1V(A)8C	70	1	98	80	60	80	-40 to 125	125	75 to 90	10	70	1.0	100	1.5	1	0.1	20	AX06	2-3
G1V(A)10C	90								95 to 110		90	0.5	60						
G1V(A)12C	100								110 to 130		100								
G1V(A)13C	110								120 to 138		110								
G1V(A)14C	120								130 to 150		120								
G1V(A)15C	115								142 to 157		115								
G1V(A)20C	170								190 to 210		170								
G1V(B)20C	170		102	120		220	-40 to 150	150	190 to 210	10	170	0.5	60	1.5	1	0.1	17	AX078	5-3
G1V(B)22C	190			160			-40 to 125	125	210 to 230		190								
G1V(B)24C	210			120			-40 to 150	150	230 to 250		210								

SURGE ABSORBERS

Varistors

■ **Features**
1. Bi-directional surge absorption is possible.
2. Low junction capacitance.

■ **Applications**
1. Telephone set surge absorption.
2. Digital communications circuit surge absorption.
3. ISDN terminal surge absorption.

Surface Mount

1F

1Y

Type No.	Absolute Maximum Ratings				Electrical Characteristics (Ta=25°C)						Outline	
	I_O [mA]	I_{FSM} [A]	Tstg [°C]	Tj [°C]	V_{F1} [V]	I_{F1} [mA]	V_{F2} [V]	I_{F2} [mA]	V_{F3} [V]	I_{F3} [mA]	Package	Fig.
VR-61F1＊1	370	7.5	-55 to 150	150	2.3±0.25	1	2.75±0.25	10	3.1±0.25	70	1F	14-1
VRYA6＊2	310	8	-30 to 125	125	2.3±0.25						1Y	21＊3
VRYA15＊2	140	6.5			5.75±0.62		6.875±0.625		7.75±0.62			

＊1: On alumina substrate
＊2: On alumina substrate, 1 element operation. 2 elements in parallel
＊3: Only SMD package

Thyristor Surge Suppressors

■ **Features**
1. Bi-directional or uni-directional characteristics.
2. High speed response.
3. Large surge current capacity.
4. Repetitive use against surges is possible.

■ **Applications**
1. Lightning surge adsorption for communications circuits.
2. Lightning surge adsorption for transmitters and switchboards.
3. Surge protection for ISDN terminals.

Surface Mount

1F

M2F

Type No.	Absolute Maximum Ratings					Electrical Characteristics						Remarks	Outline	
	I_{TSM} [A]	Conditions [μs]	V_{DRM} [V]	Tstg [°C]	Tj [°C]	V_{BO} (min) [V]	V_{CL} (max) [V]	I_{DRM} (max) [μA]	Conditions V_D [V]	I_H (min) [mA]	Cj (max) [pF]		Package	Fig.
KL3Z07	30	10/1000	5	-40 to 125	125	5.5*1	–	10	5	50	–	–	1F	14-3
KL3Z18			15			15.5*1			15					
KL3L07			58			65	80		58	100 (150)*2	90			
KL3N14			120			130	195		120		50			
KL3R20			175			180	250		175		30			
KU4F8	40		70			75	–	10	70	100	100	–	M2F	15-2
KU4F12			100			110			100					
☆**KU5S31NS**	50		275			–	420	5	275	150	70	–	M2F	15-2
☆**KU10L06**	100		48			55	70	10	48	100 (150)*2	235	®E	M2F	15-2
KU10L08			63			70	100	5	63		180			
KU10N14			120			125	195		120		140			
☆**KU10R23NS**			190			–	260		190		90	–		
KU10R27NS			220				320		220		70	®E		
KU10R29NS			250				400		250					
KU10S31NS			275				420		275		90	–		
☆**KU10S35NS**							450							
KU15N14	150		120			125	195	5	120	100	110	®E	M2F	15-2

☆: New product　∗1 : V_{BR}　∗2 : 150mA available　®E : UL497B recognized (File No. E183905)

Power ZENERs

Zeners (Trankillers)

■ **Features**
1. High speed response.
2. Absorption energy tolerance capacity.
3. Narrow clamping voltage width.

■ **Applications**
1. IC protection for telephones.
2. IC protection against abnormal voltage.
3. Protection for load dump noise.

Power Dissipation 1W


1F

Type No.	Absolute Maximum Ratings				Electrical Characteristics							Outline	
	P_{RSM} [W]	Tstg [°C]	Tj [°C]	V_{RM} (max) [V]	V_{BR} (typ) [V]	Conditions I_R [mA]	I_R (max) [μA]	Conditions V_R [V]	rz (max) [%/°C]	V_{CL}* (max) [V]	Conditions I_{PP} [A]	Package	Fig.
★ST04-12F1	400	-40 to 150	150	9	12.5	1	5	9	0.09	–	–	1F	13-2
ST04-14F1				12.8	14			12.8		22	18		
ST04-16F1		-55 to 175		13.6	16			13.6		23	15		
ST04-18F1				15.3	18			15.3		26			
★ST04-20F1		-40 to 150		16	20			16		–	–		
★ST04-24F1				20	24			20					
ST04-27F1		-55 to 175		23	27			23		37	10		
★ST04-30F1		-40 to 150		24	30			24	0.12	–	–		
ST04-33F1				25	33			25		50	8		
ST04-36F1				27	36			27		55	7.5		
★ST03-39F1	300	-40 to 150	150	30	39	1	5	30	0.12	–	–		
★ST03-43F1				33	43			33	–				
ST03-47F1				37	47			37		70	5		
ST03-58F1		-55 to 150		45	58			45		80	4		
ST03-68F1		-40 to 150		58	68			58		95	3		
★ST02-82F1	200	-40 to 150	150	67	82	1	5	67	–	118	1.7		
★ST02-100F1				80	100			80		140	–		
★ST02-120F1				100	120			100		170			
★ST02-140F1				120	145			120		200	1		
★ST02-170F1				145	170			145		280	0.75		
★ST02-200F1				170	200			170		300	0.7		
ST03-240F1	310	-55 to 175	150	200	235	1	5	200	–	310	1		
★ST02-280F1	200	-40 to 150	150	230	280	1	5	230	–	–	–		
★ST02-320F1				260	320			260					
◎DL04-18F1	400	-55 to 150	150	13	18	5	5	13	–	27	15	1F	14-2

★: Under development ◎: Bi-directional type ∗: V_{CL} 10/1000 μs

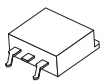
Power Dissipation 3W


2F

Type No.	Absolute Maximum Ratings				Electrical Characteristics							Outline	
	P_{RSM} [W]	Tstg [°C]	Tj [°C]	V_{RM} (max) [V]	V_{BR} (typ) [V]	Conditions I_R [mA]	I_R (max) [μA]	Conditions V_R [V]	rz (max) [%/°C]	V_{CL}* (max) [V]	Conditions I_{PP} [A]	Package	Fig.
★ST20-27F2	2000	-55 to 150	150	23	27	1	5	23	0.07	–	–	2F	16-5
★ST20-30F2				24	30			24	0.12				
★ST20-33F2				25	33			25					
★ST20-36F2				27	36			27					

★: Under development ∗: V_{CL} 10/1000 μs

Power Dissipation 5W (Load Dump Surge Protecting)


STO-220


MCP

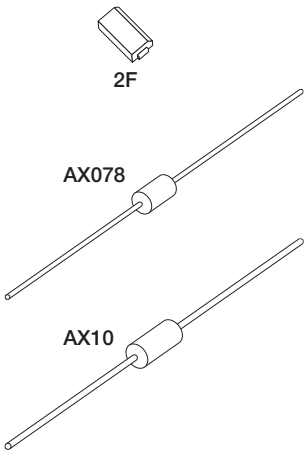
Type No.	Absolute Maximum Ratings				Electrical Characteristics							Outline	
	P_{RSM} [W]	Tstg [°C]	Tj [°C]	V_{RM} (max) [V]	V_{BR} (typ) [V]	Conditions I_R [mA]	I_R (max) [μA]	Conditions V_R [V]	rz (max) [%/°C]	V_{CL}* (max) [V]	Conditions I_{PP} [A]	Package	Fig.
ST80-14MF	8000	-40 to 150	150	12	14	1	10	12	0.08	–	–	MCP	80
★ST70-25MF	7000	-40 to 150	150	22	25	1	5	22	0.09	40	180	MCP	80
ST70-27F				23	27			23				STO-220	36-6
ST70-27MF												MCP	80
ST70-30MF				26	30			26		–	–		
ST60-40MF	6000	-40 to 150	150	32	40	1	5	32	0.12	–	–	MCP	80
ST60-48MF				40	48.6			40	0.15	60	100		

★: Under development ∗: V_{CL} 10/1000 μs

Power Clampers

■ **Features**
1. High speed response.
2. Absorption energy tolerance capacity.
3. Narrow clamping voltage width.
4. Reverse blocking type.

■ **Applications**
1. Snubber circuit in the primary side of switch-mode power supplies.



Type No.	Absolute Maximum Ratings				Electrical Characteristics						Outline		
	P_{RSM} [W]	Tstg [°C]	Tj [°C]	V_{RM} (max) [V]	V_{BR} (typ) [V]	Conditions I_R [mA]	I_R (max) [μA]	Conditions V_R [V]	V_{CL} (max) [V]	Conditions I_{PP} [A]	Package	Color Code	Fig.
ST02D-82	200	-40 to 150	150	67	82	1	5	67	118	1.7	AX078	Silver	5-2
ST03D-82	300									2.5	AX10		6-2
★ST02D-140F2	200	-40 to 150	150	120	145	1	5	120	200	1	2F	–	16-3
ST02D-140											AX078	Blue	5-2
ST03D-140	300									1.5	AX10		6-2
ST02D-170F2	200	-40 to 150	150	145	170	1	5	145	280	0.75	2F	–	16-3
ST02D-170											AX078	Red	5-2
ST03D-170	300									1.1	AX10		6-2
ST02D-200	200	-40 to 150	150	170	200	1	5	170	300	0.7	AX078	Yellow	5-2
ST03D-200	300									1	AX10		6-2
☆ST03DH-240	200	-40 to 150	150	200	250	1	5	200	–	–	AX10	–	6-2
★ST03DH-280				230	300			230					
★ST03DH-320				260	350			260					

☆: New product ★: Under development

Power MOSFETs

Hi-Pot MOS® Series

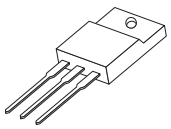
Surface Mount

FB

Type No.	Absolute Maximum Ratings					Electrical Characteristics							Outline	
	VDSS	ID	PT	VGSS	Tch	RDS(ON) (max)	Ciss (typ)	Coss (typ)	Crss (typ)	Qg (typ)	Vth (typ)	θjc (max)	Package	Fig.
	[V]	[A]	[W]	[V]	[°C]	[Ω]	[pF]	[pF]	[pF]	[nC]	[V]	[°C/W]		
☆P9B40HP2	400	9	40	±30	150	0.8	575	60	5	14.5	3.75	3.12	FB	99
☆F6B52HP	525	6	15			1.2	580	65	4	10		8.33		

☆: New product

Three Terminal Type



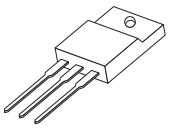
FTO-220AG

Type No.	Absolute Maximum Ratings					Electrical Characteristics							Outline	
	VDSS	ID	PT	VGSS	Tch	RDS(ON) (max)	Ciss (typ)	Coss (typ)	Crss (typ)	Qg (typ)	Vth (typ)	θjc (max)	Package	Fig.
	[V]	[A]	[W]	[V]	[°C]	[Ω]	[pF]	[pF]	[pF]	[nC]	[V]	[°C/W]		
☆P5F50HP2	500	5	65	±30	150	1.6	400	45	4	10.5	3.75	1.92	FTO-220AG	51A-2
☆P6F50HP2		6	70			1.25	500	55	4.2	12.5		1.78		
☆P8F50HP2		8	75			1	610	65	5	15		1.66		
☆P10F50HP2		10	80			0.75	820	85	6	20		1.56		
☆P13F50HP2		13	85			0.6	1050	105	6	25		1.47		
☆P15F50HP2		15	90			0.5	1340	120	8.5	32		1.39		
☆P20F50HP2		20	95			0.36	1735	176	10	40		1.32		
☆P3F60HP2	600	3	65			2.3	400	40	3.6	9.6		1.92		
☆P4F60HP2		4	70			1.8	505	48	3.8	11.5		1.78		
☆P5F60HP2		5	75			1.4	615	58	4.3	14.2		1.66		
☆P7F60HP2		7	80			1.05	810	75	5	18.5		1.56		
☆P10F60HP2		10	85			0.8	1040	100	6	23		1.47		
☆P12F60HP2		12	90			0.67	1230	110	6	26.5		1.39		
☆P15F60HP2		15	95			0.49	1750	150	7	37		1.32		

☆: New product

CoolMOS® CP Series

Three Terminal Type



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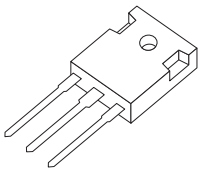


MTO-3P

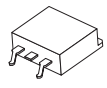
Type No.	Absolute Maximum Ratings					Electrical Characteristics							Outline	
	VDSS	ID	PT	VGSS	Tch	RDS(ON) (max)	Ciss (typ)	Coss (typ)	Crss (typ)	Qg (typ)	Vth (typ)	θjc (max)	Package	Fig.
	[V]	[A]	[W]	[V]	[°C]	[Ω]	[pF]	[pF]	[pF]	[nC]	[V]	[°C/W]		
F11F60CPM	600	11	50	±30	150	0.299	1100	60	2.5	22	3.0	2.5	FTO-220A	50-2
☆F16F60CPM		16	55			0.199	1520	72		33		2.27		
☆F21F60CPM		21	60			0.165	2000	100		39		2.08		
☆F25F60CPM		25	70			0.125	2500	120		53		1.78		
F31W60CP		31	120			0.099	2800	130	1.5	60		1.04	MTO-3P	46-2
F39W60CP		39	125			0.075	4500	220	3	83		1		
F60W60CP		60	140			0.045	6800	320	1	146		0.89		

☆: New product

*CoolMOS is a trademark of Infineon Technologies AG.

CoolMOS® C3 Series

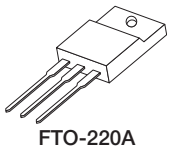
Surface Mount



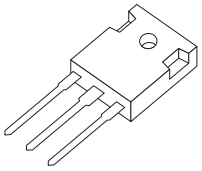
STO-220

Type No.	Absolute Maximum Ratings					Electrical Characteristics							Outline	
	VDSS	ID	PT	VGSS	Tch	RDS(ON) (max)	Ciss (typ)	Coss (typ)	Crss (typ)	Qg (typ)	Vth (typ)	θjc (max)	Package	Fig.
	[V]	[A]	[W]	[V]	[°C]	[Ω]	[pF]	[pF]	[pF]	[nC]	[V]	[°C/W]		
F20S60C3	600	20	50	±30	150	0.19	2400	780	50	87	3.0	2.5	STO-220	36-3
F11S80C3	800	11				0.45	1690	740	22	54				

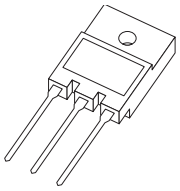
Three Terminal Type



FTO-220A



MTO-3P



ITO-3P

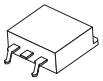
Type No.	Absolute Maximum Ratings					Electrical Characteristics							Outline	
	VDSS	ID	PT	VGSS	Tch	RDS(ON) (max)	Ciss (typ)	Coss (typ)	Crss (typ)	Qg (typ)	Vth (typ)	θjc (max)	Package	Fig.
	[V]	[A]	[W]	[V]	[°C]	[Ω]	[pF]	[pF]	[pF]	[nC]	[V]	[°C/W]		
F7F60C3M	600	7	30	±30	150	0.60	760	250	20	28	3.0	4.16	FTO-220A	50-2
F11F60C3M		11	45			0.38	1200	390	30	45		2.77		
F15F60C3M		15	55			0.28	1600	510	40	56		2.27		
F20F60C3M		20	65			0.19	2400	780	50	87		1.92		
F20W60C3			75									1.66	MTO-3P	46-2
F24W60C3		24	90			0.16	3000	1000	60	105		1.39		
F35W60C3		35	100			0.10	4500	1500	100	155		1.25		
F47W60C3		47	120			0.07	7000	2200	145	235		1.04		
FP11W60C3		11	45			0.38	1200	390	30	45		2.77	ITO-3P	44-3
FP20W60C3		20				0.19	2400	780	50	87		2.77		
F11F80C3M	800	11	40			0.45	1690	740	22	54		3.12	FTO-220A	50-2

*CoolMOS is a trademark of Infineon Technologies AG.

EETMOS®2 Series

Surface Mount

FB



FG

Type No.	Absolute Maximum Ratings					Electrical Characteristics							Outline	
	VDSS	ID	PT	VGSS	Tch	RDS(ON) (max)	Ciss (typ)	Coss (typ)	Crss (typ)	Qg (typ)	Vth (typ)	θjc (max)	Package	Fig.
	[V]	[A]	[W]	[V]	[°C]	[mΩ]	[pF]	[pF]	[pF]	[nC]	[V]	[°C/W]		
☆P50B4EA	40	50	62.5	±20	150	4.5	2670	500	220	52	2.0	2	FB	99
☆P25B6EB	60	25	35			29	785	115	45	14.5		3.55		
☆P50B6EA		50	62.5			8.5	2760	355	145	50		2		
☆P80FG6EA		80	128			4.9	4300	600	250	72		0.97	FG	34
☆P85FG6EA		85	156			4.3	5200	700	280	94		0.8		

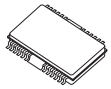
☆: New product

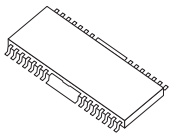
Power ICs

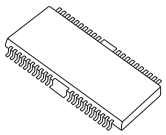
Stepper Motor Driver ICs : MTD Series

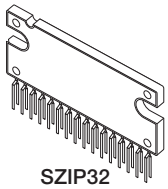
■ **Outline** The MTD series is monolithic power ICs that, with fewer external components, can directly drive any motors.

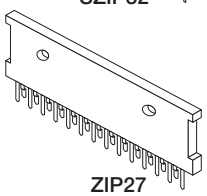
■ **Applications**
1. Stepper motor drive for office equipment products.
2. Stepper motor drive for industrial robots, automatic equipments.


HSOP24


HSOP28


HSOP40


SZIP32


ZIP27

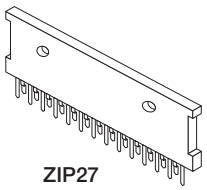
Type No.	Operation	Io [A]	VO [V]	Characteristics	Outline	
					Package	Fig.
MTD1120	Unipolar	1.2	80	4-Phase Input	ZIP27	89
MTD1120F				4-Phase Input	HSOP28	81
MTD1121F				4-Phase Input	HSOP28	81
MTD1361F			68	DMOS, 4-Phase Input	HSOP28	81
MTD1361		1.5		DMOS, 4-Phase Input	ZIP27	89
MTD2002F	Bipolar	0.8	35	2-bit Digital Current Selection	HSOP28	81
MTD2017F				Quarter Step Operation	HSOP28	81
MTD2017G				Quarter Step Operation	HSOP24	91
MTD2018F				Quarter Step Operation	HSOP28	81
MTD2018G				Quarter Step Operation	HSOP24	91
MTD2038G		1	40	Quarter Step Operation	HSOP24	91
MTD2525J				Dual Motor Driver	HSOP40	82
MTD2007F			50	Quarter Step Operation	HSOP28	81
MTD2003F		1.2	30	2-bit Digital Current Selection	HSOP28	81
MTD2003B			35	2-bit Digital Current Selection	ZIP27	89
MTD2003G				2-bit Digital Current Selection	HSOP24	91
MTD2003S				2-bit Digital Current Selection	SZIP32	93
MTD2009J				Dual Motor Driver	HSOP40	82
MTD2006F		1.3		Current Decay Mode	HSOP28	81
MTD2006G				Current Decay Mode	HSOP24	91
MTD2005			50	Current Decay Mode	ZIP27	89
MTD2005F				Current Decay Mode	HSOP28	81
MTD2033G		1.5	40	2-bit Digital Current Selection	HSOP24	91
MTD2029J			50	Quarter Step Operation	HSOP40	82

Power ICs for Interface : MTA Series

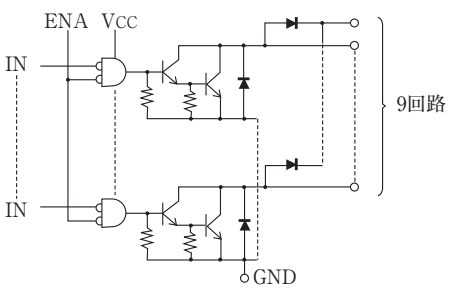
■ **Outline** The MTA Series is monolithic power ICs best fit for use as needle print head drivers of dot matrix printers, and as stepping motor drivers.

■ **Features**
1. The input is TTL and CMOS compatible
2. Large output Ic=2A, V_{CE}=60V or 80V
3. Insulated type single in-line packaging with heatsink installed

■ **Applications**
1. Head driver for dot matrix printers, ECR and time recorders
2. Stepping motor drive for printers, typewriters, FAX, PPC and XY plotters
3. Driver for all types of solenoids, and displays (LED, etc.)


ZIP27

Type No.	Absolute Maximum Ratings(Ta=25°C)			Operation			Outline	
	V_{CEO} [V]	Io [A]	P_D [W]	Input	Output	Circuits	Package	Fig.
MTA001M	80	2	5	L Active	NPN Darlington	9	ZIP27	89
MTA011				H Active				
MTA002	60			L Active	PNP Darlington			



Equivalent circuit (MTA001M)

We are happy to provide circuit design support for safe use of our IC products.
Please consult our sales representatives.

DC-DC Converter Power ICs : MD series

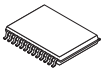
■ **Outline**

The MD Series is a non-isolated, PWM control stepdown DC-DC converter power IC whose MOSFET and drive circuit IC chip integration eliminates the complexity of power supply circuit design.
Two rectification systems are available: flywheel Schottky diode type and highly efficient synchronous rectification MOSFET type.
A high-performance power supply can be easily realized by choosing a suitable MD chip.
The MD Series is available in SMD type HSOP28, SSOP32, LSSOP26, and SOP8 packages.

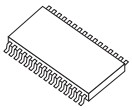
■ **Features**

1. High-efficiency
The MD Series consists of a matched control IC and main switching MOSFET in a single package, which allows the construction of a highly efficient power supply with little switching loss and wiring loss.
2. Switching Frequency
Choose the switching frequency matched to the usage conditions from among 250kHz fixed type, 100kHz/300kHz switched type, and 100kHz to 500kHz adjustable type.
3. Protection Functions
The MD Series has overcurrent protection, thermal shutdown, undervoltage lockout (UVLO) and etc.

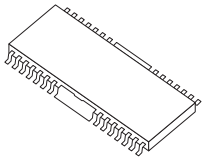
SOP8



LSSOP26



SSOP32



HSOP28

Type No.	Input Voltage [Vin]	Output Voltage [Vout]	Output Current [A]	Frequency [kHz]	Operation Temp [°C]	Rectification System	Outline	
							Package	Fig.
MD5001T	4.5 to 14	0.8 to 12*2	0 to 1	100 to 500*4	-40 to 85	Fly wheel SBD	SOP8	90
MD5021T			0 to 2					
MD5031T	8 to 24	0.8 to 20*2	0 to 1					
MD3221N	4.5 to 20	2.5/3.3*1 0.8 to 14*2	0 to 3	100/300*3	-30 to 85	Synchronous	SSOP32	83
MD3221R		0.8 to 14*2					LSSOP26	84
MD3222N		2.5/3.3*1 0.8 to 14*2	0 to 6				SSOP32	83
MD1222N	8 to 20	2.5 to 12*2	0 to 5	250				
MD1320F	12 to 30	3.3/5*1	0 to 3		-10 to 80	Fly wheel SBD	HSOP28	81
MD1322F	8 to 30	2.5 to 12*2						
MD1320N		3.3/5*1	0 to 1.5		-30 to 85		SSOP32	83
MD1322N		2.5 to 12*2	0 to 1.8					
MD1323R				100 to 500*4			LSSOP26	84
MD1333N			0 to 5					
MD1421N	8 to 40	3.3/5*1	0 to 3	250		Synchronous	SSOP32	83
MD1422N		2.5 to 12*2						
MD1423N				100 to 500*4				
MD1423R							LSSOP26	84
MD1424R		0.8 to 12*2						

*1: Selectable output voltage 3.3V/5V
*2: Adjustable output voltage
*3: Selectable 100k/300kHz
*4: Adjustable from100k to 500kHz

We are happy to provide circuit design support for safe use of our IC products.
Please consult our sales representatives.

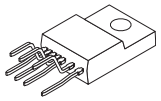
Partial Resonance Power Supply ICs : MR series

■ **Outline**

The MR series is Partial Resonance Power Supply IC modules featuring standby mode operation for very low power consumption. A main switching device and a control circuit are incorporated in a single package.
Highly efficient and low noise power supplies can easily be designed with a minimum number of external components using the MR series IC.

■ **Features**

1. Burst mode operation for very low standby power
2. High efficiency, low noise
3. No start-up resistance is required
4. Over current protection
5. Over voltage protection
6. Thermal shutdown



FTO-7P

Type No.	Absolute Maximum Ratings[W]*			Main Switch		Outline	
	AC90 to 132V	AC180 to 276V	AC90 to 276V	Device	V_{DS} [V]	Package	Fig.
MR4500	12(Peak 20)	–	–	MOSFET	500	FTO-7P	86
MR4510	25(Peak 40)						
MR4520	50(Peak 80)						
MR4530	80(Peak 100)						
MR4710	–	25(Peak 40)	12(Peak 20)		700		
MR4720		50(Peak 80)	25(Peak 40)				
MR4010		65	45	2 nd Generation High Speed IGBT	900		
MR4020		105	70				
MR4030		135	90				
MR4040		180	120				

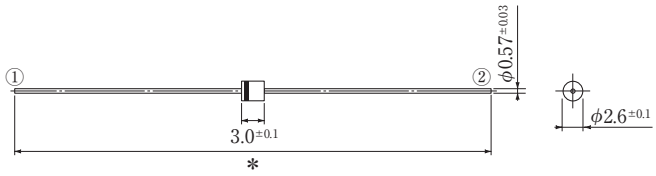
*: The value is for reference. Maximum output power varies with power supply design.

We are happy to provide circuit design support for safe use of our IC products.
Please consult our sales representatives.

OUTLINE DIMENSIONS

[*Unit : mm*]

Fig.1 Package : AX057



* $26.0^{+1.5}_{-0.0}$ (Spec Code: 5070)
$52.0^{+2.0}_{-1.0}$ (Spec Code: 5060)

Fig.2 Package : AX06

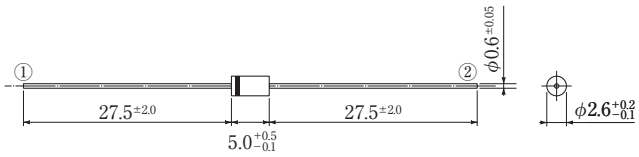


Fig. 2-1

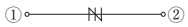


Fig. 2-2

Fig. 2-3

Fig.3 Package : AX06

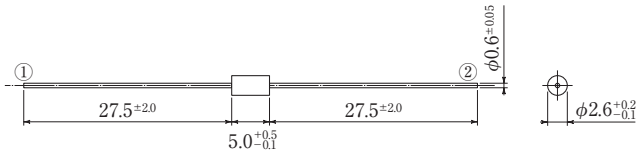


Fig.5 Package : AX078

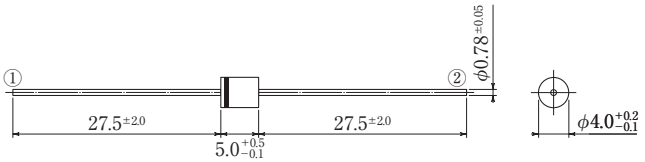


Fig. 5-1

Fig. 5-2

Fig. 5-3

Fig. 5-4

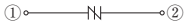


Fig.6 Package : AX10

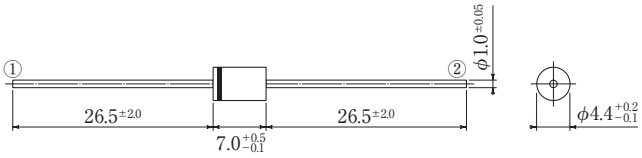


Fig. 6-1

Fig. 6-2

Fig. 6-3

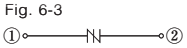
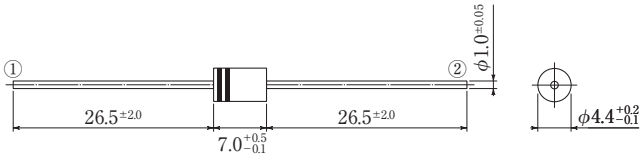
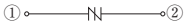


Fig.7 Package : AX10





OUTLINE DIMENSIONS

[*Unit : mm*]

Fig.8 Package : AX14

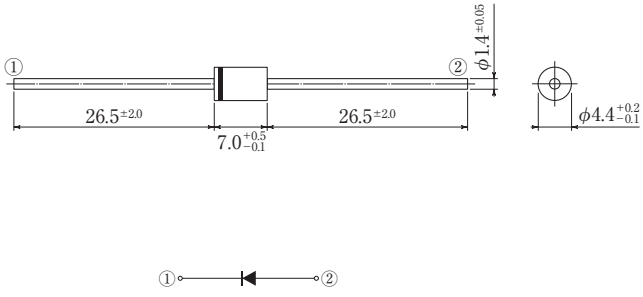


Fig.9 Package : AD

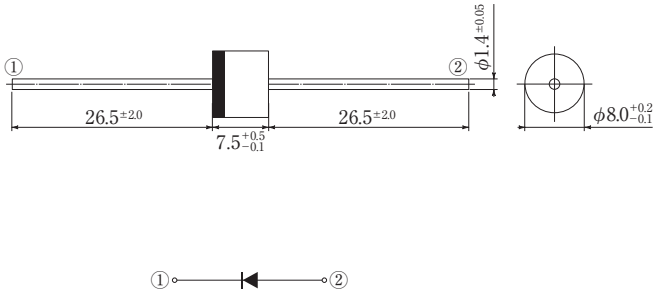


Fig.12 Package : M1F

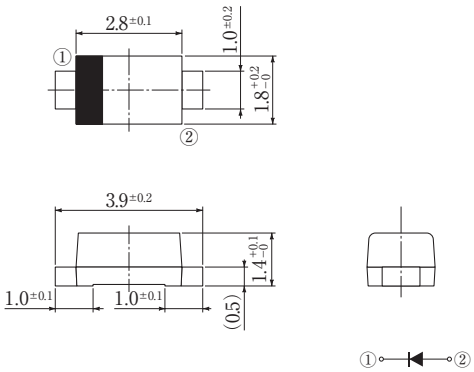


Fig.13 Package : 1F

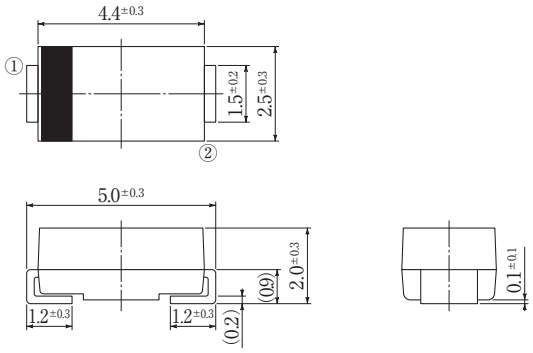


Fig. 13-1 ①—▶|—②

Fig. 13-2 ①—▶|—②

Fig. 13-3 ①—▶|—②

Fig.14 Package : 1F

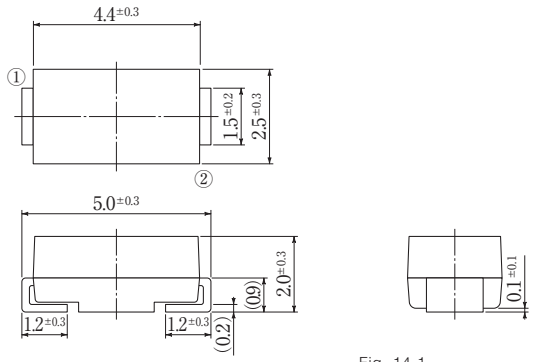
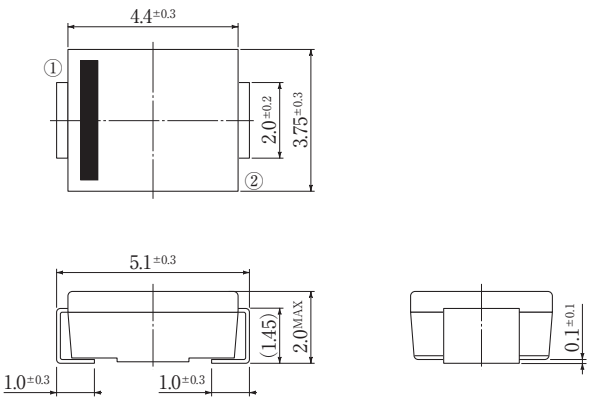


Fig. 14-1 ①—▶▶|—②

Fig. 14-2 ①—▶|—②

Fig. 14-3 ①—▶▶|—②

Fig.15-1 Package : M2F



①—▶|—②

[*Unit : mm*]

Fig.15-2 Package : M2F

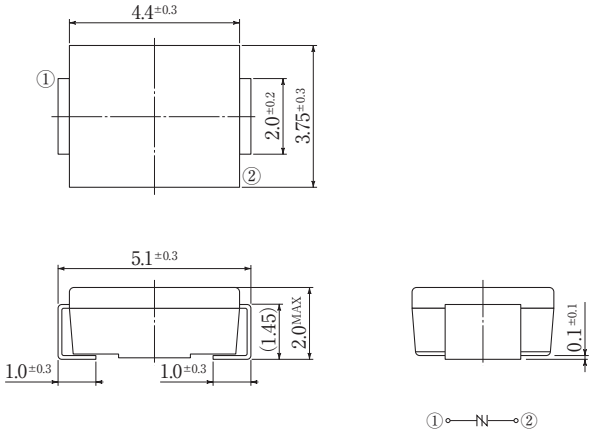


Fig.15-3 Package : M2F

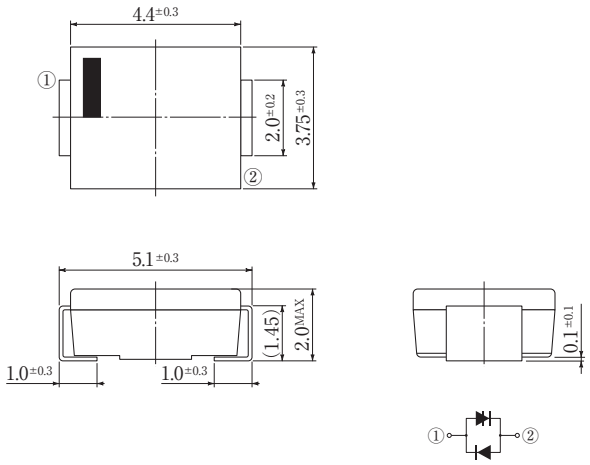


Fig.16 Package : 2F

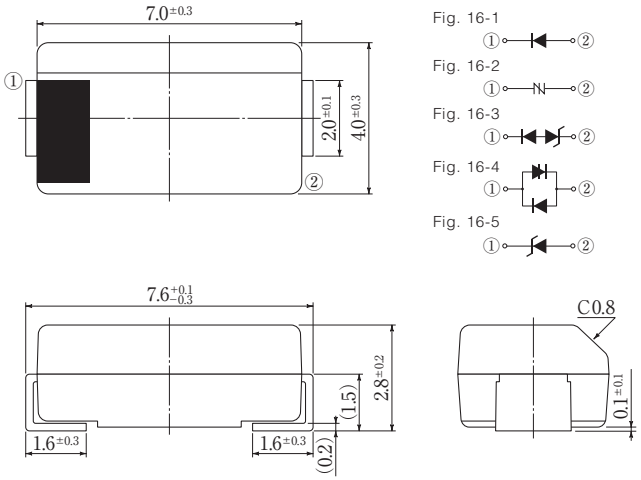


Fig.21 Package : 1Y(SMD)

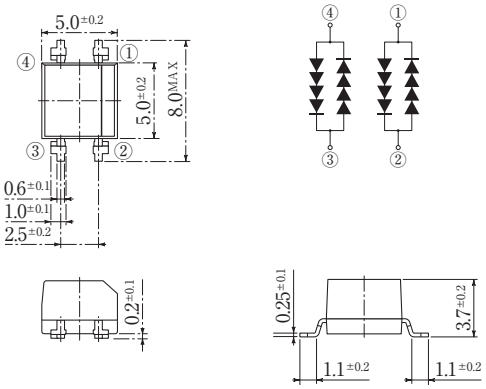


Fig.22 Package : 1Y(DIP)

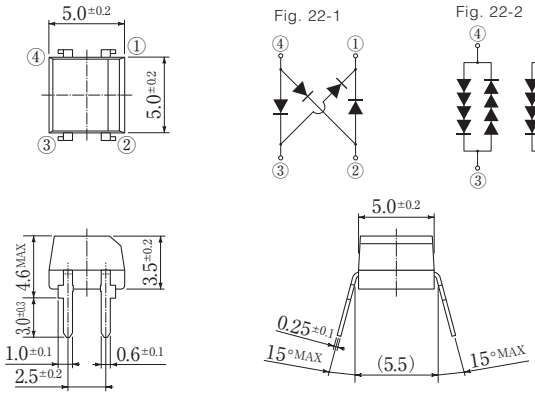
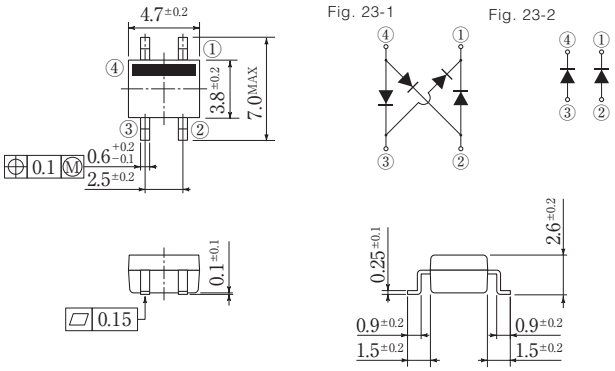


Fig.23 Package : 1Z(SMD)



OUTLINE DIMENSIONS

[*Unit : mm*]

Fig.24 Package : 1Z(DIP)

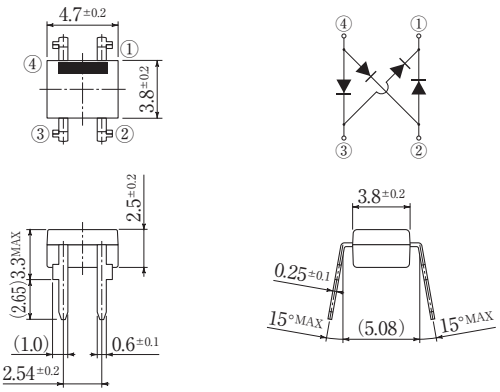


Fig.25 Package : 1N(SMD)

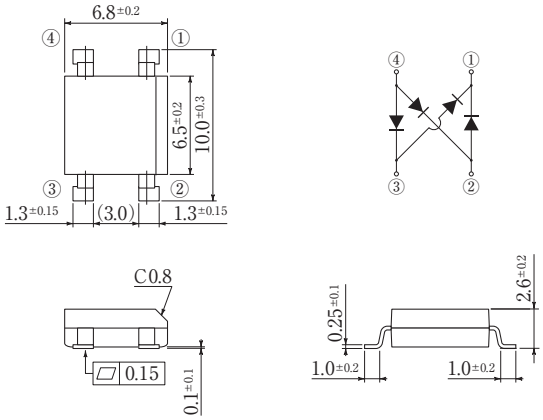


Fig.26 Package : 1N(DIP)

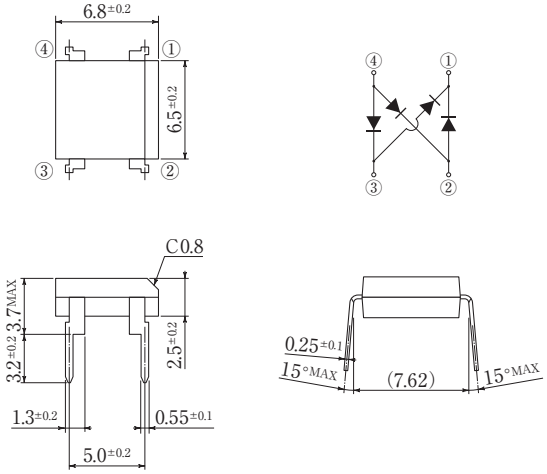


Fig.27 Package : 1NA(SMD)

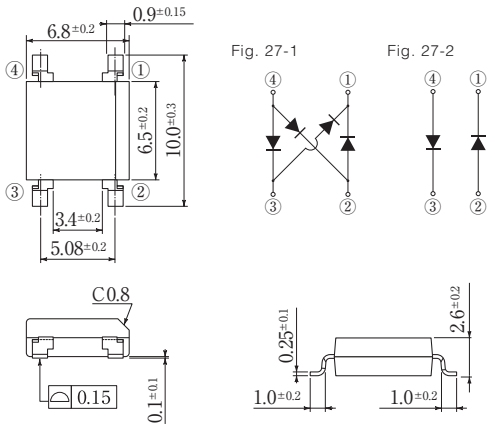


Fig.28 Package : 1NA(DIP)

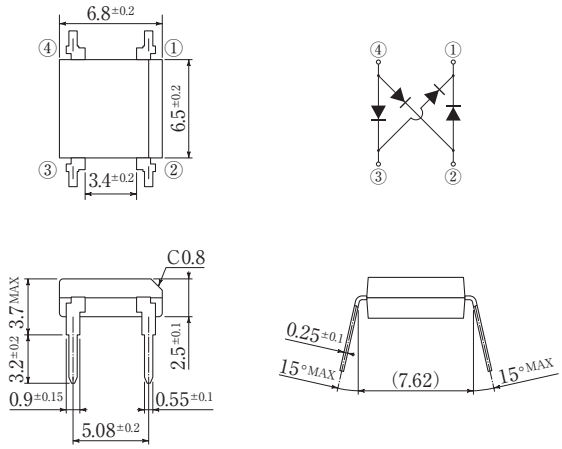
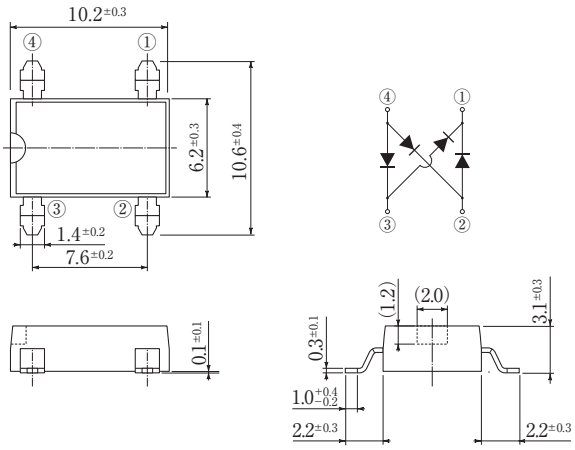


Fig.29 Package : 1W(SMD)



[*Unit : mm*]

Fig.30 Package : 1W(DIP)

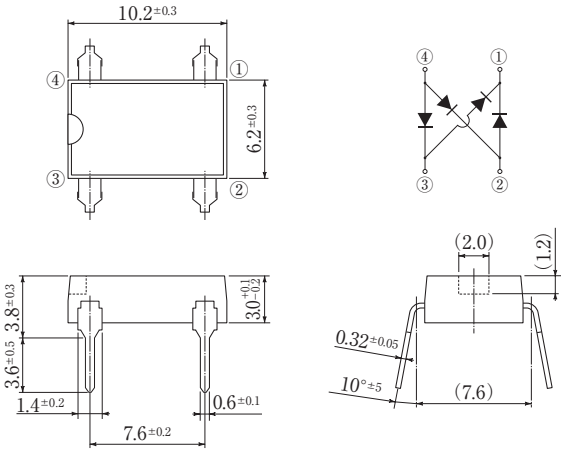


Fig.31 Package : E-pack

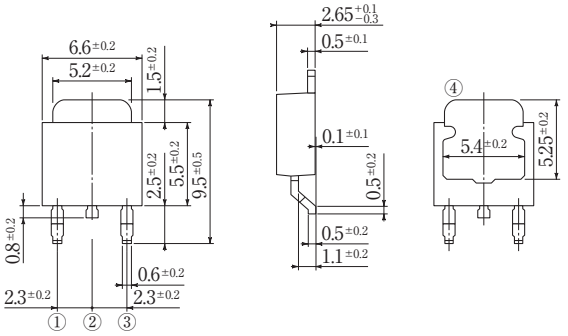


Fig. 31-1

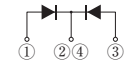


Fig. 31-3

①:G
②:D
③:S
④:D

Fig. 31-4

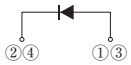


Fig. 31-2

Fig. 31-5

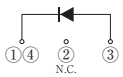


Fig.33 Package : SOPA-4

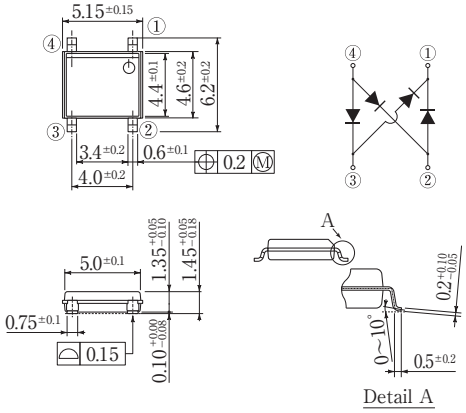
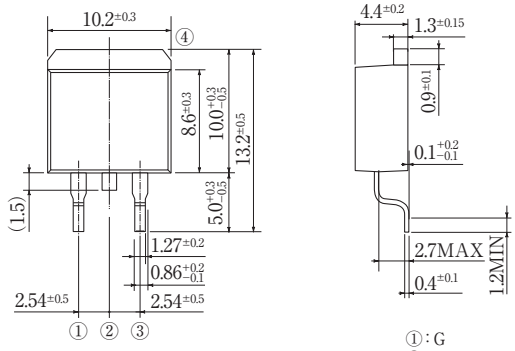


Fig.34 Package : FG



①:G
②:D
③:S
④:D

Fig.36 Package : STO-220

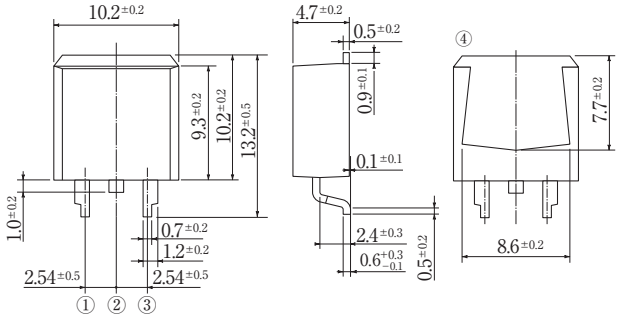


Fig. 36-1

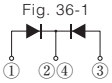


Fig. 36-3

①:G
②:D
③:S
④:D

Fig. 36-4

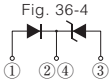


Fig. 36-6

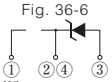


Fig. 36-2

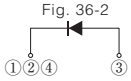


Fig. 36-5

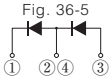


Fig. 36-7

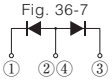
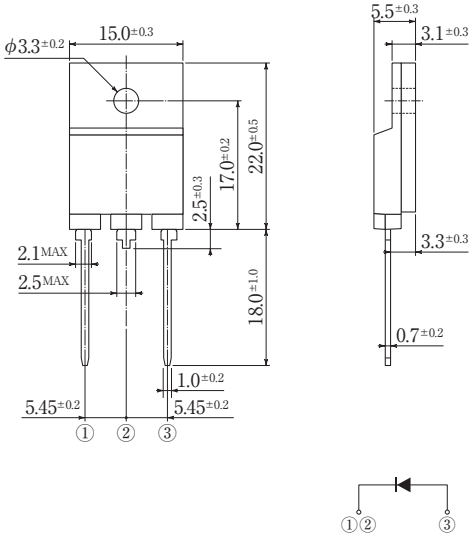


Fig.43 Package : ITO-3P(2pin)



OUTLINE DIMENSIONS

[*Unit : mm*]

Fig.44 Package : ITO-3P(3pin)

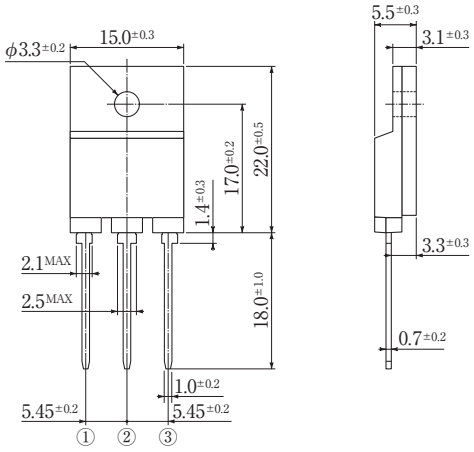


Fig. 44-1 Fig. 44-2 Fig. 44-3

①:G
②:D
③:S

Fig.46 Package : MTO-3P(3pin)

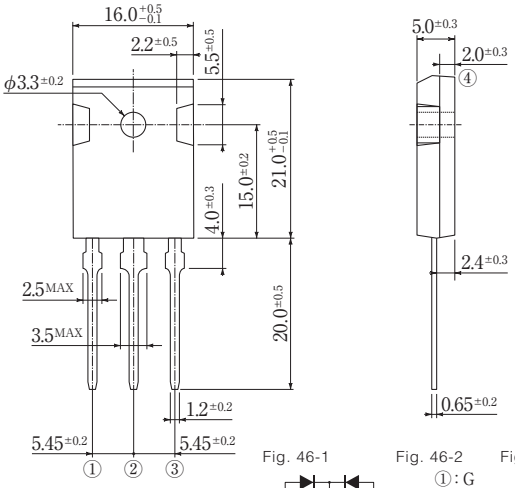


Fig. 46-1 Fig. 46-2 Fig. 46-3

①:G
②:D
③:S
④:D

Fig.47 Package : FTO-220(2pin)

Fig.48 Package : FTO-220(3pin)

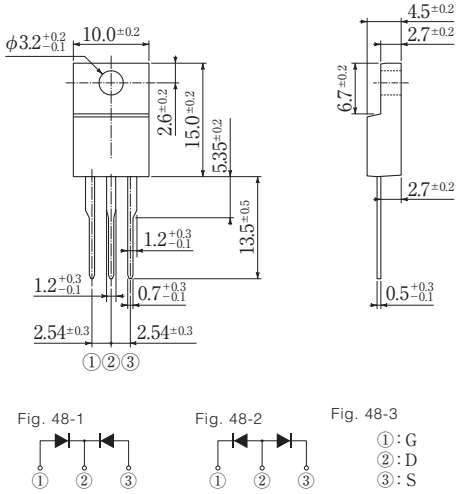


Fig. 48-1 Fig. 48-2 Fig. 48-3

①:G
②:D
③:S

Fig.49 Package : FTO-220A(2pin)

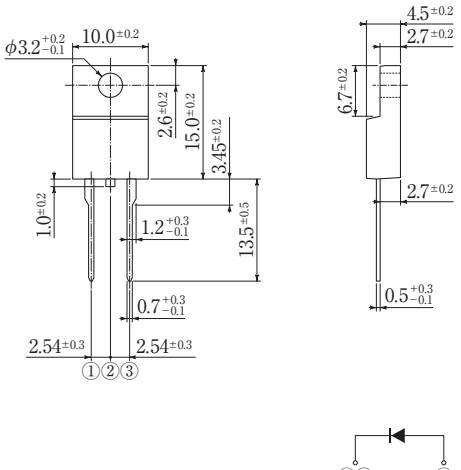


Fig.50 Package : FTO-220A(3pin)

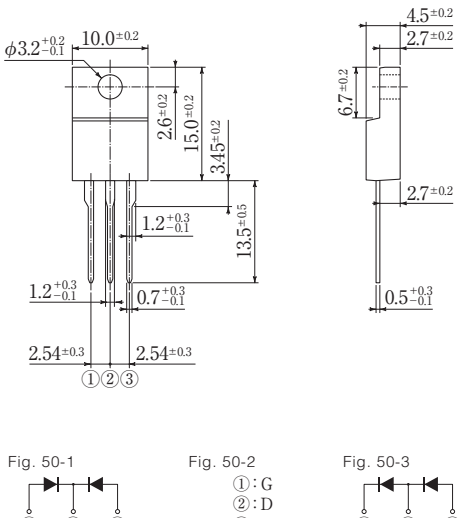


Fig. 50-1 Fig. 50-2 Fig. 50-3

①:G
②:D
③:S

[*Unit* : *mm*]

Fig.51 Package : FTO-220AG(2pin)

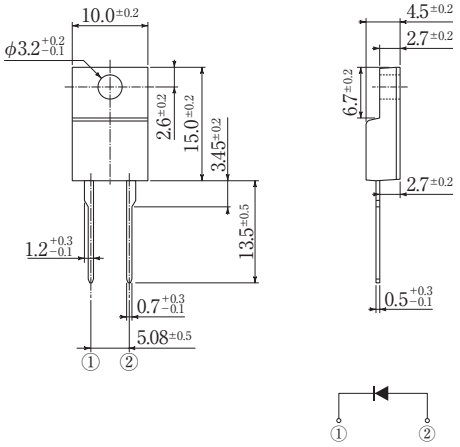


Fig.51A Package : FTO-220AG(3pin)

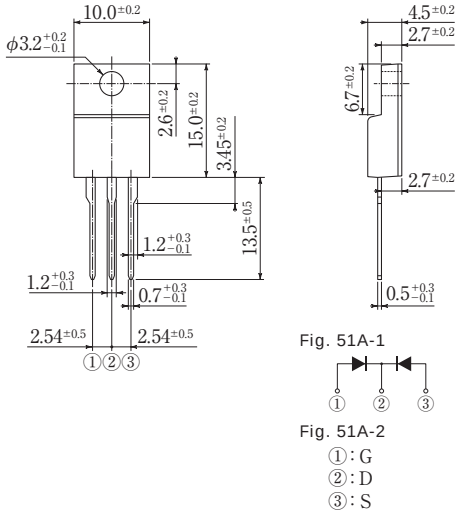


Fig. 51A-1

Fig. 51A-2

①: G
②: D
③: S

Fig.52 Package : FTO-220G(3pin)

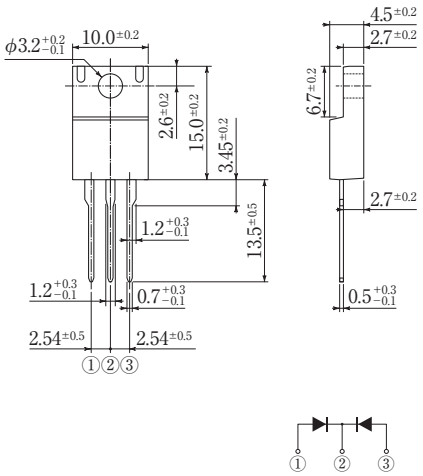


Fig.52A Package : FTO-220G(2pin)

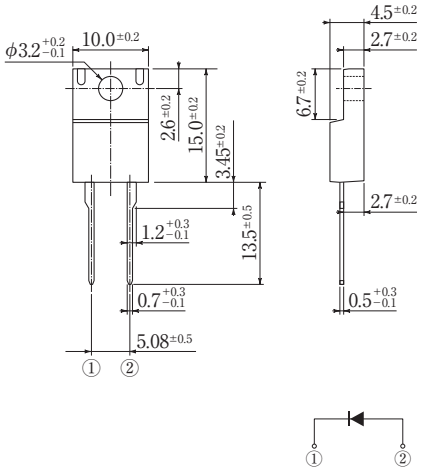


Fig.54 Package : D3K

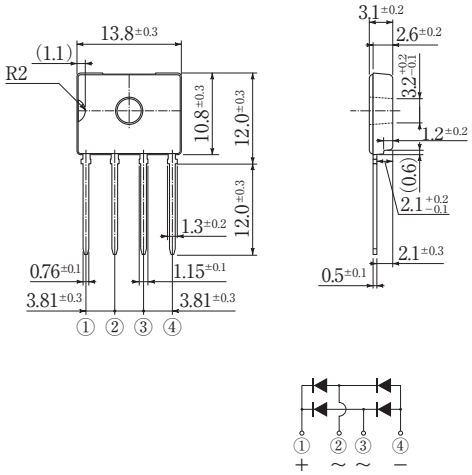
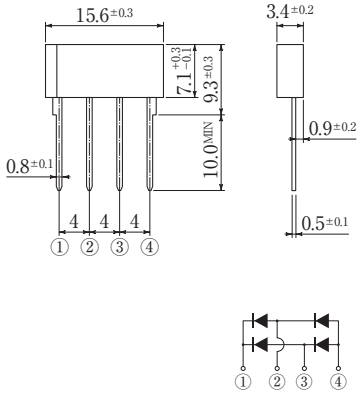


Fig.55 Package : 1V



OUTLINE DIMENSIONS

[*Unit : mm*]

Fig.56 Package : 2S

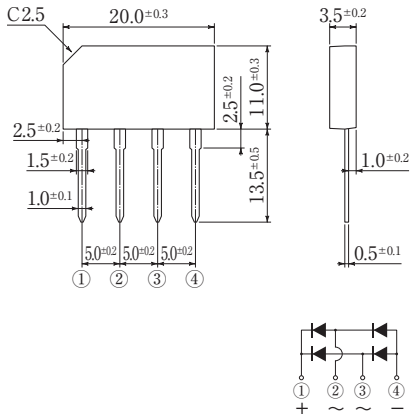


Fig.57 Package : 3S

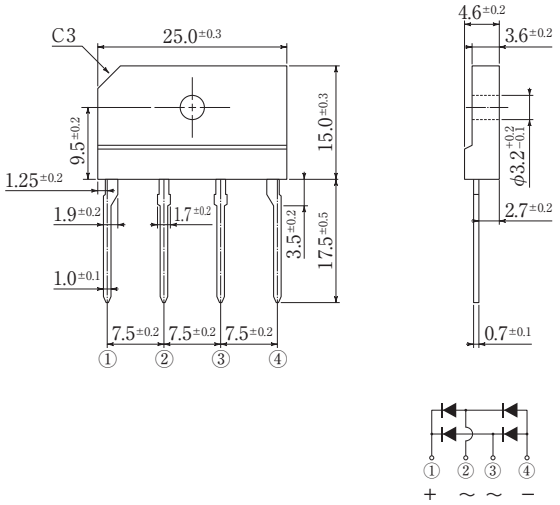


Fig.58 Package : 5S

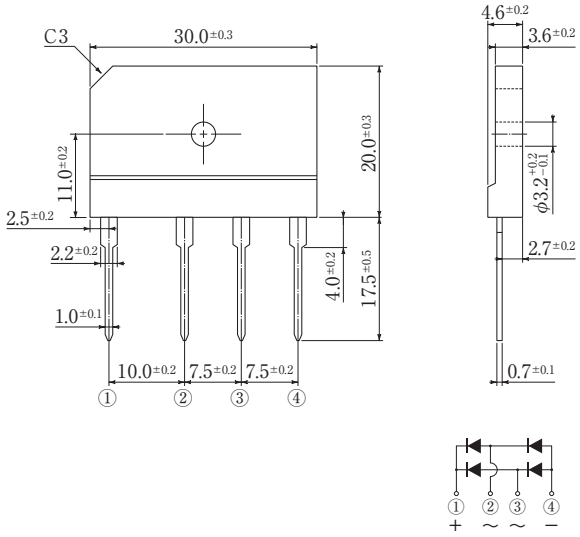


Fig.59 Package : TSB(4pin)

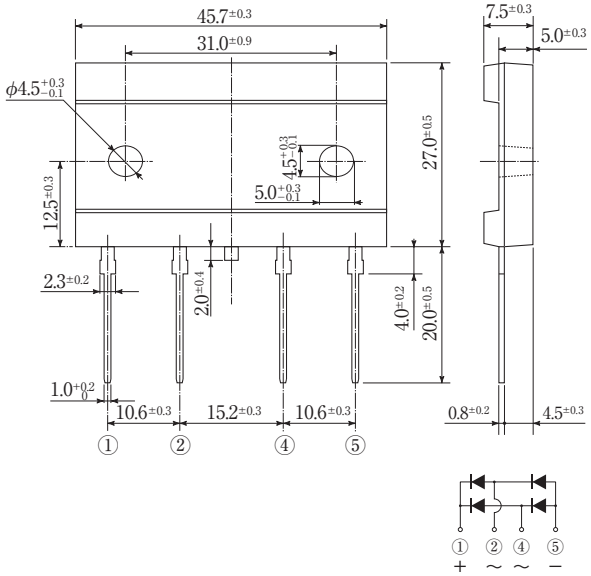


Fig.60 Package : TSB(5pin)

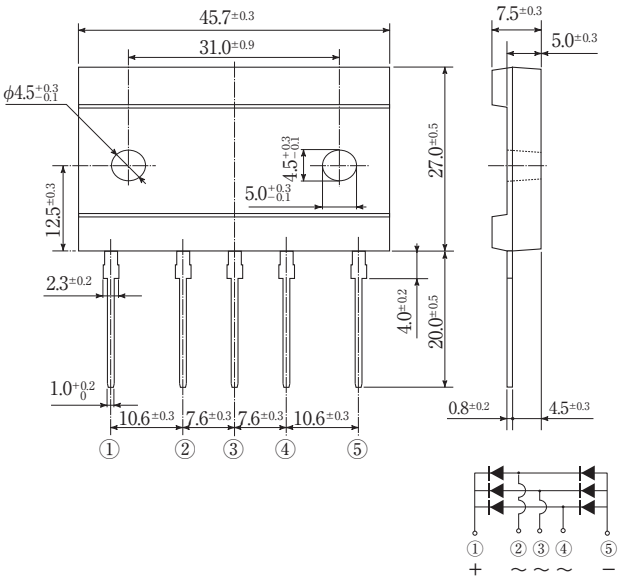
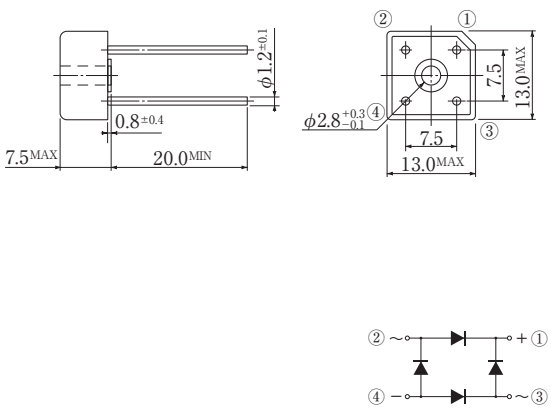


Fig.61 Package : S2VB



[*Unit : mm*]

Fig.62 Package : S4VB

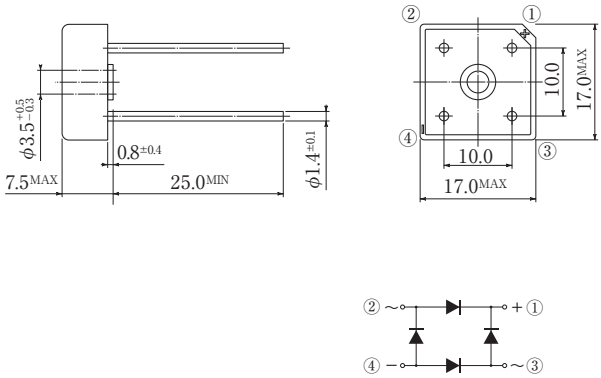


Fig.63 Package : S5VB

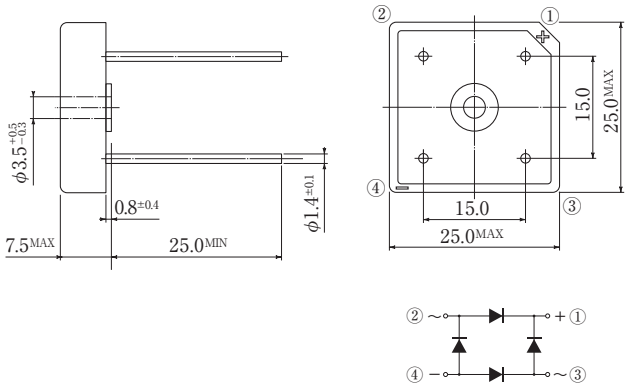


Fig.64 Package : S10VB

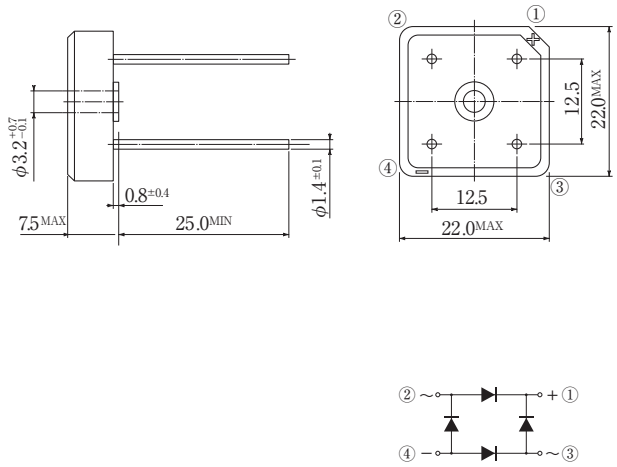


Fig.65 Package : S15VB

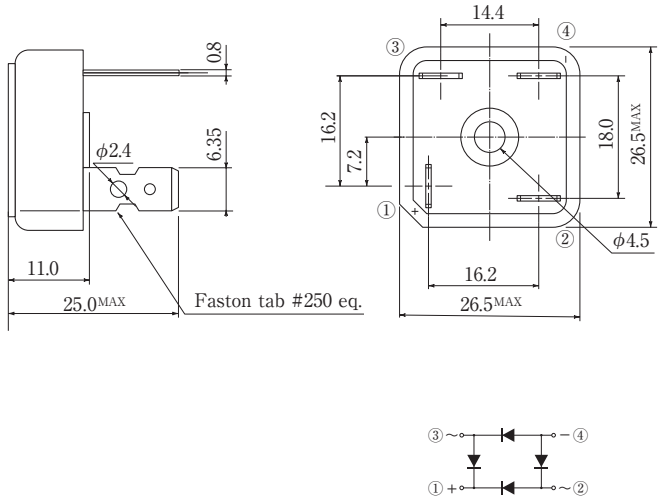


Fig.66 Package : S25VB

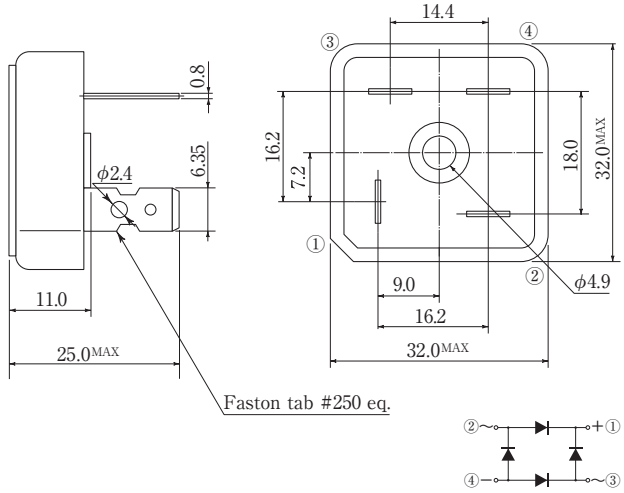
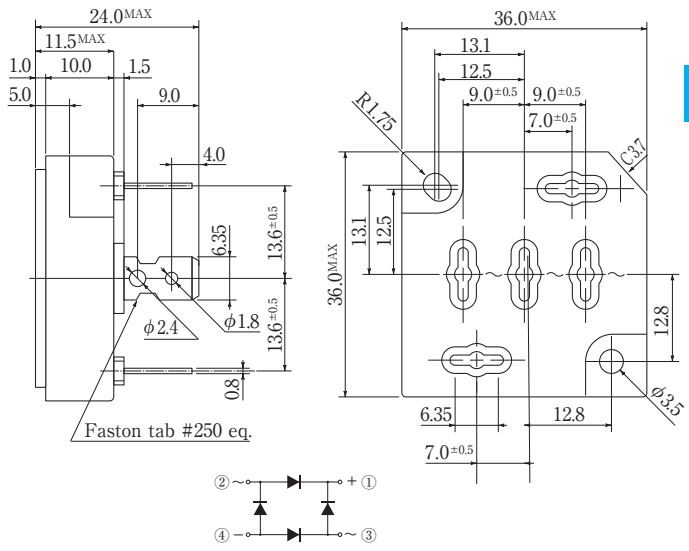


Fig.67 Package : S50VB



OUTLINE DIMENSIONS

[*Unit* : *mm*]

Fig.68 Package : S3WB

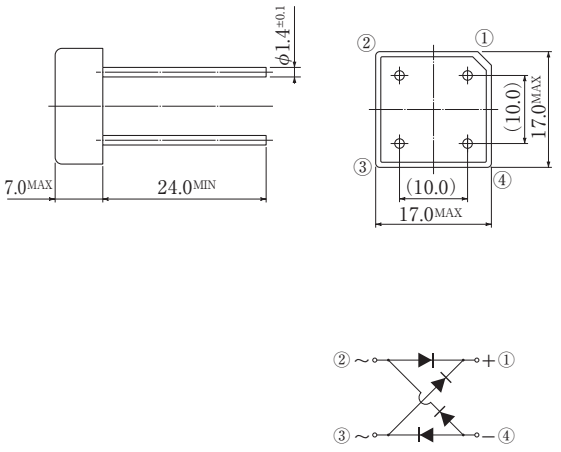


Fig.69 Package : S10WB

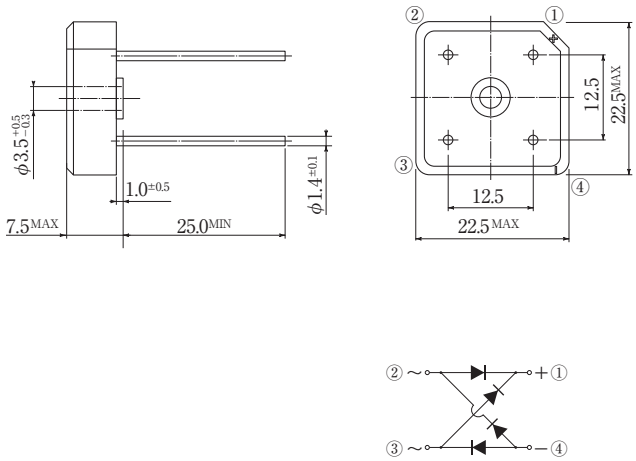


Fig.70 Package : S20WB

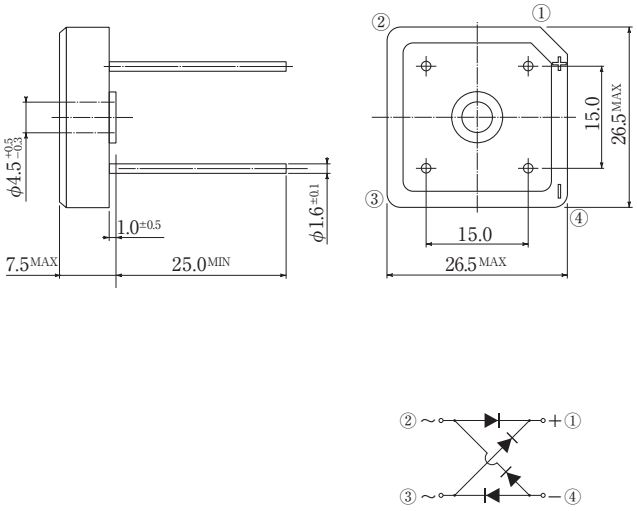


Fig.71 Package : S20WB

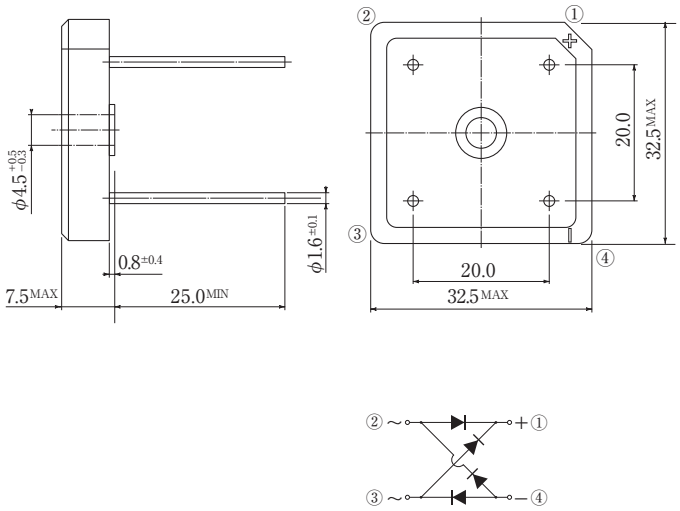


Fig.72 Package : JA

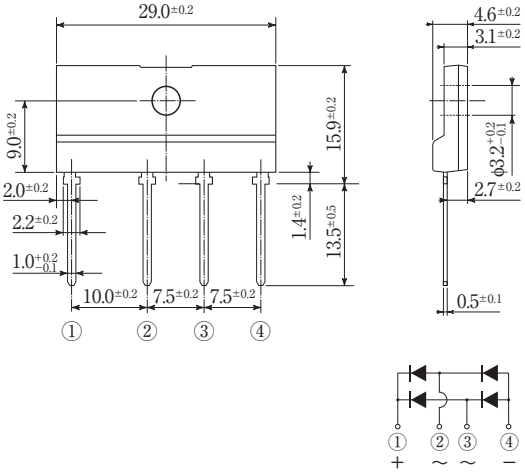
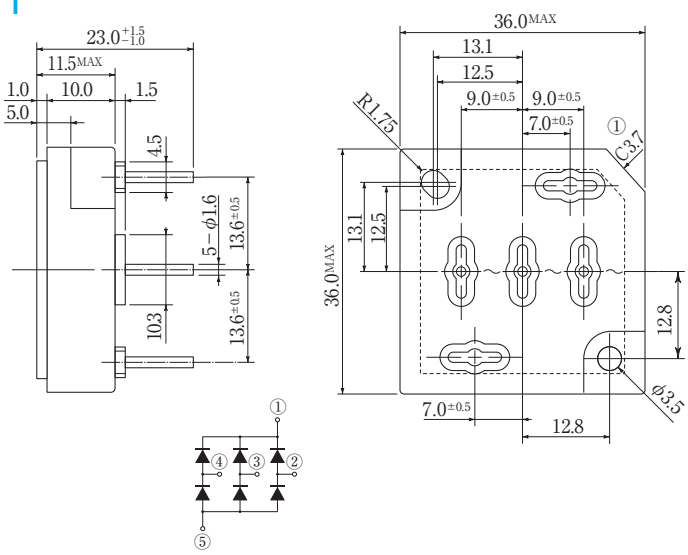


Fig.73 Package : SVTA



[*Unit : mm*]

Fig.74 Package : SVT

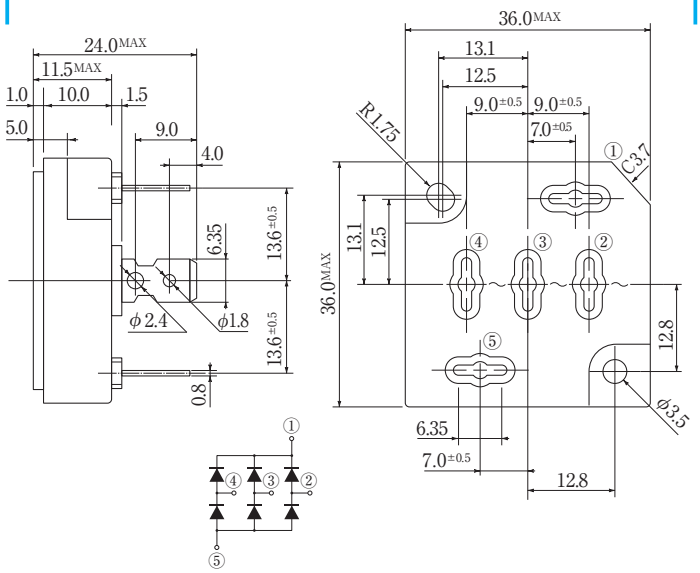


Fig.75 Package : JB

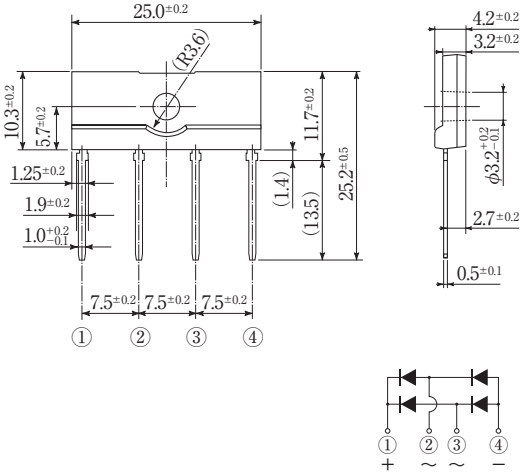


Fig.76 Package : D30VC

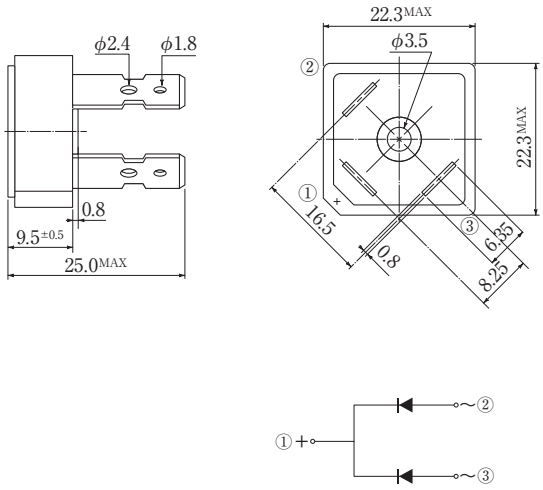


Fig.77 Package : Module

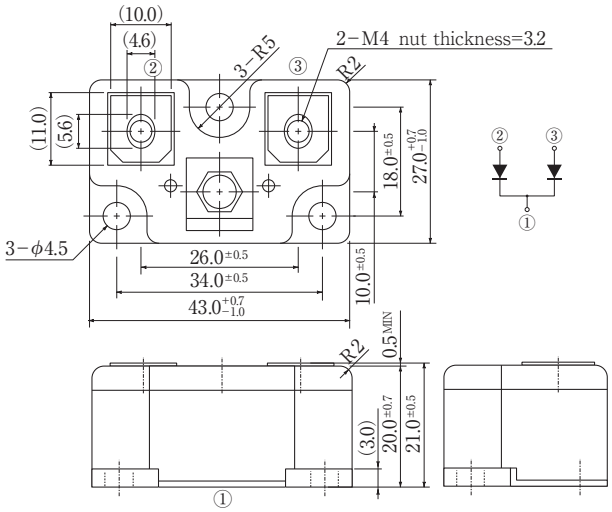


Fig.78 Package : Module

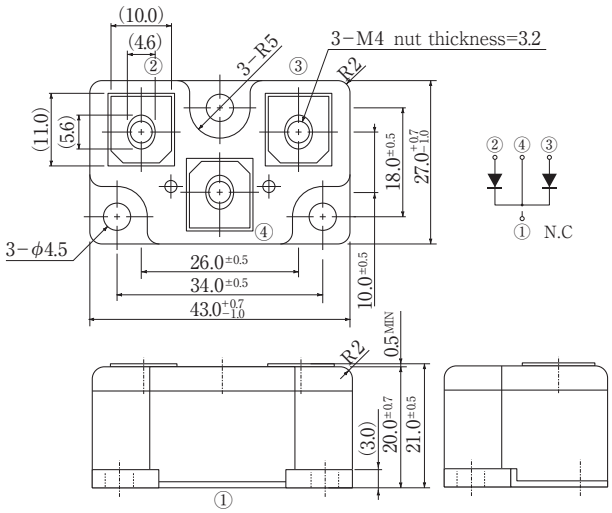
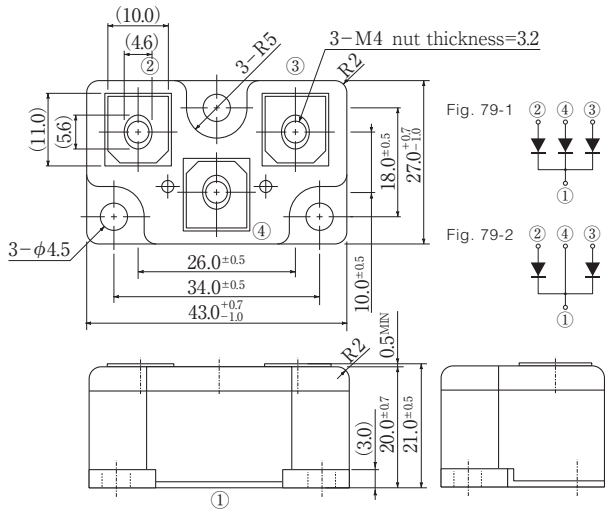


Fig.79 Package : Module



OUTLINE DIMENSIONS

[*Unit : mm*]

Fig.80 Package : MCP

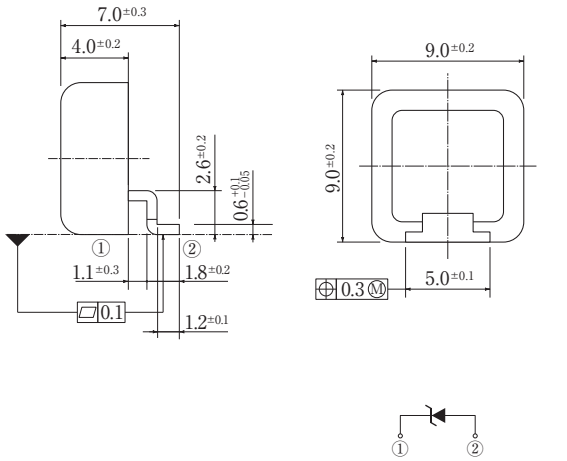


Fig.81 Package : HSOP28

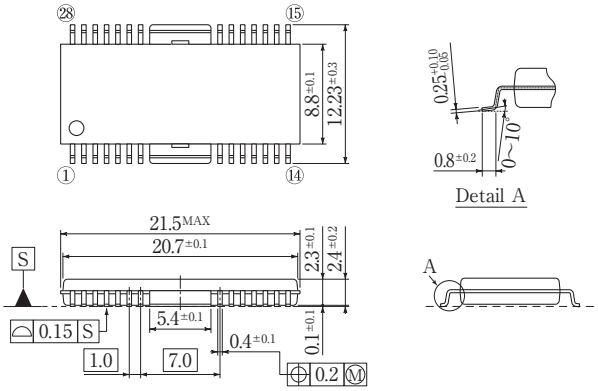


Fig.82 Package : HSOP40

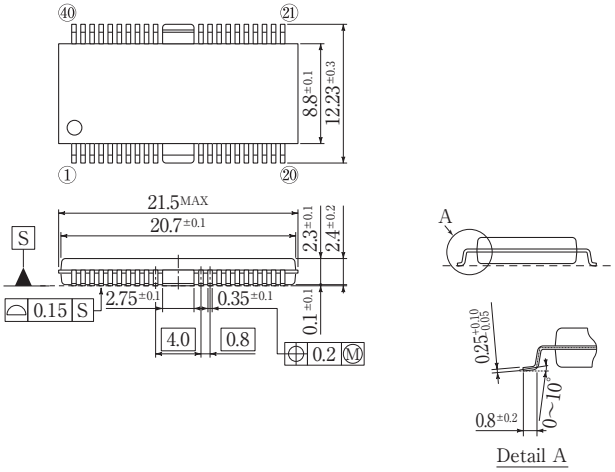


Fig.83 Package : SSOP32

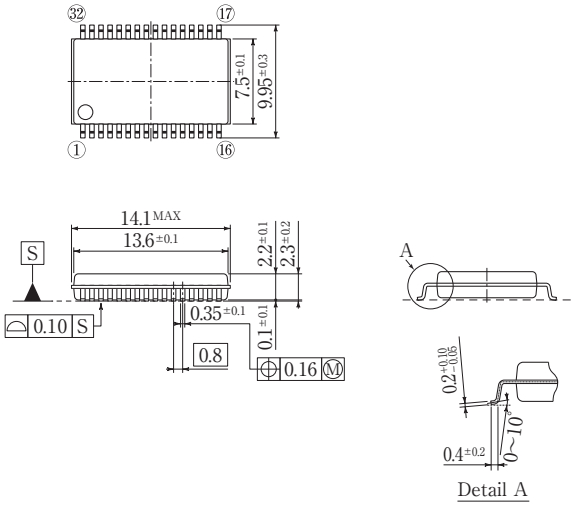


Fig.84 Package : LSSOP26

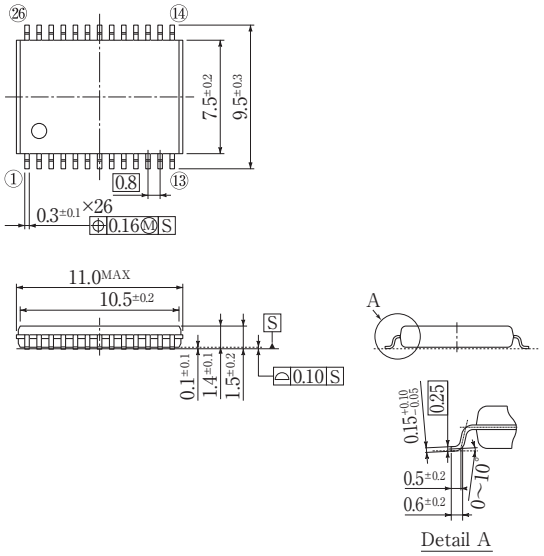
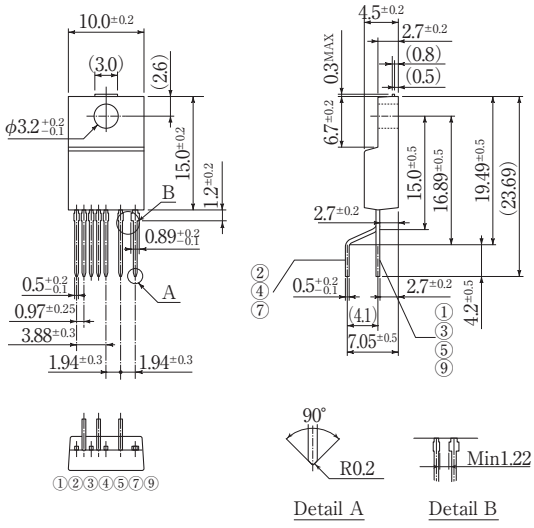


Fig.86 Package : FTO-7P



[*Unit : mm*]

Fig.89 Package : ZIP27

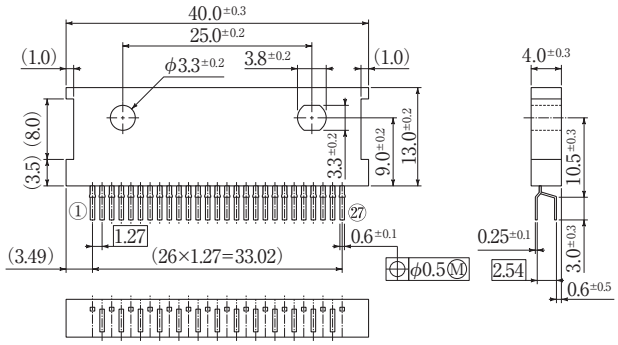


Fig.90 Package : SOP8

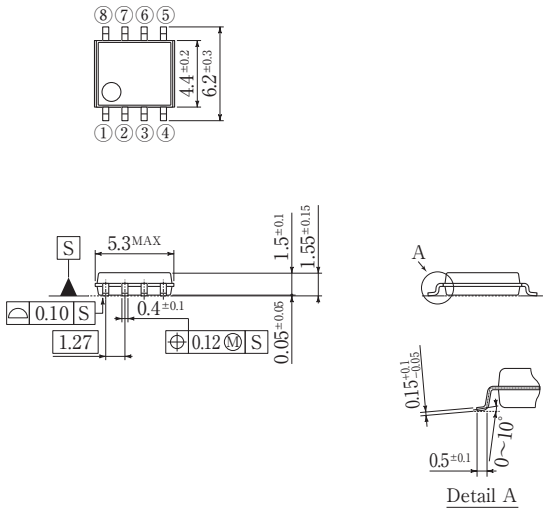


Fig.91 Package : HSOP24

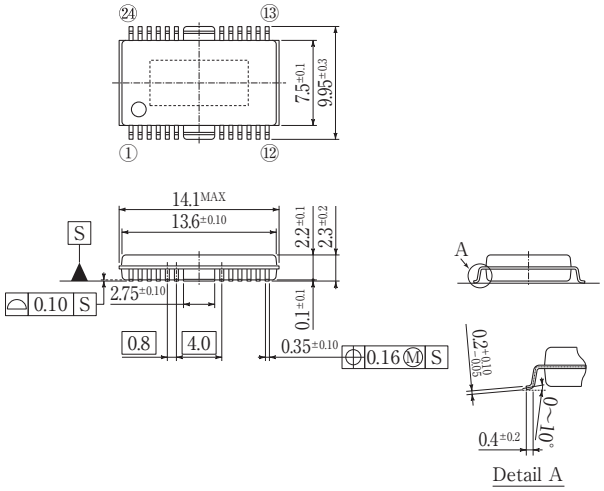


Fig.93 Package : SZIP32

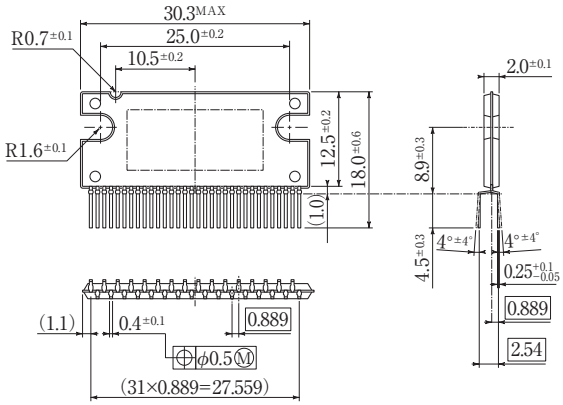


Fig.95 Package : MTO-3PT(2pin)

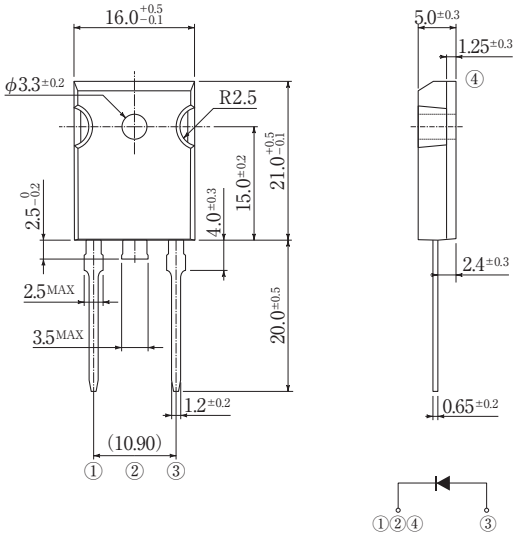
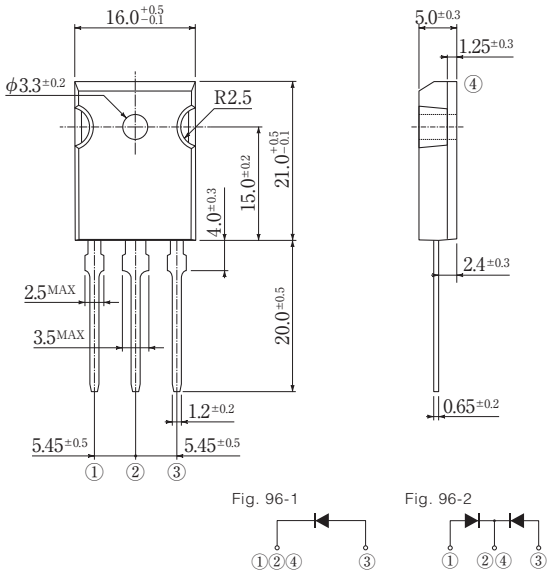


Fig.96 Package : MTO-3PT(3pin)



OUTLINE DIMENSIONS

[*Unit : mm*]

Fig.98 Package : MTO-3PV

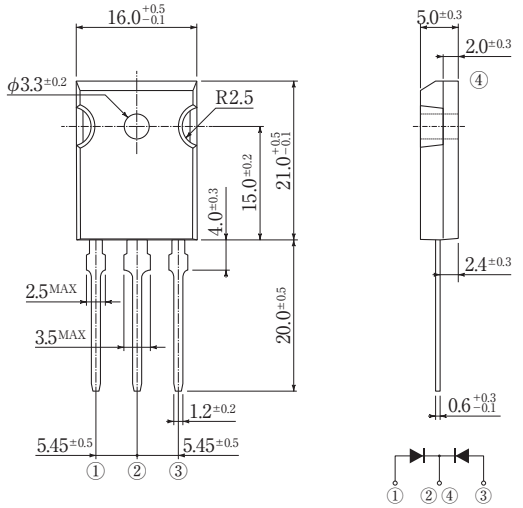


Fig.99 Package : FB

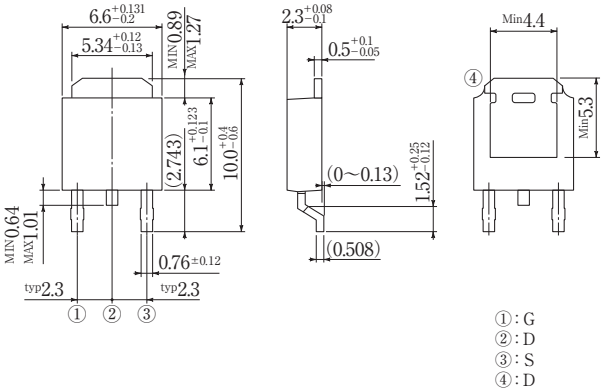
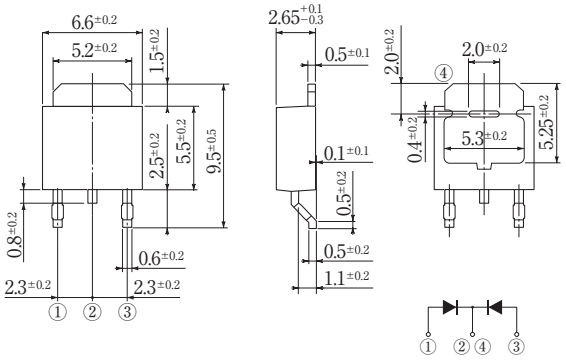


Fig.100 Package : FE



How to Order

1.Indication of Spec Code when ordering

Please specify the Spec Code when ordering semiconductors.
For Spec Code, Please reter to as follows and "Ordreing Quality and Packing Form"

Example Ordering 7101 (lead) type of S1YB60
S1YB60-7101

2. Spec Code

The code specifies each packing form, lead forming and terminal plate material.
Please reter to "Ordreing Quality and Packing Form"

Example

5 0 0 0

Terminal forming
0 : Straight terminal
1 to 9 : Each number shows type of form

Packing Form
In case of surface mounting devices
6 : Small reel
7 : Large reel
In case of axial devices
6 : Lead length 52mm (T52)
7 : Lead length 26mm (T26)

Minimum packing unit
0 : Bulk, tray or taping
1 : Magazine
6 : Packed (FTO-220 Package)

Terminal plate material
3 : Ni/Pd/Au
4 : Ni or Ag
5 : Sn-Ag-Cu, Sn, Ag, Sn-Cu
6 : Sn
7 : Sn-Bi

Outline of Packing Form

1. Minimum packing unit

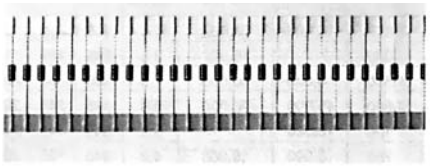
■ **Bulk:** The form in which parts are inserted into plastic bags or cardboard boxes.
■ **Tray:** The form in which parts are inserted into containers made of resin.

■ **Magazine:** The form in which parts are inserted into resin cartridges designated for automatic inserters.

■ **Taping**

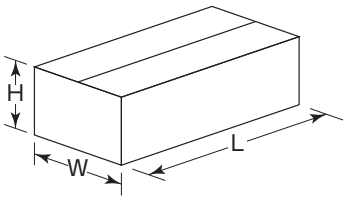
• Reel (Surface mounting devices)

• Box (Axial devices)



2. Packing Box Dimensions

See the following pages for the dimensions of each cardboard box.



Ordering Quantity and Packing Form

Please make your orders: 'more than Inner Box Quantities' and 'a multiple of each Packing Unit'

Package		Fig.	Spec Code	Terminal Plating	Remarks	Quantity	Inner Box		Standard Packing		Packing Box (mm)		
							Method	Quantity (Pcs./Box)	Pcs./Box	Weight (kg)	L	W	H
AX057		1	5060	Sn		4,000	Tape, Ammo-Pack 52mm	4,000	32,000	7.5	330	280	270
			5070			3,000	Tape, Ammo-Pack 26mm	3,000	36,000	6.2	340	270	230
AX06	Zeners SIDACs	2,3	4000	Ag		200	Bulk	200	20,000	5.9	480	355	230
			4060			4,000	Tape, Ammo-Pack 52mm	4,000	64,000	14.0	325	325	420
			4061			4,000	Tape & Reel, Diameter 300 ϕ	4,000	20,000	6.3	325	325	420
			4070			3,000	Tape, Ammo-Pack 26mm	3,000	84,000	15.7	325	325	420
	Varistors		5000	Ag		200	Bulk	200	20,000	5.9	480	355	230
			5060			4,000	Tape, Ammo-Pack 52mm	4,000	64,000	14.0	325	325	420
			5061			4,000	Tape & Reel, Diameter 300 ϕ	4,000	20,000	6.3	325	325	420
			5070			3,000	Tape, Ammo-Pack 26mm	3,000	84,000	15.7	325	325	420
AX078	Zeners SIDACs	5	4000	Ag		200	Bulk	200	16,000	7.9	480	355	230
			4060			2,000	Tape, Ammo-Pack 52mm	2,000	32,000	14.7	325	325	420
			4070			1,500	Tape, Ammo-Pack 26mm	1,500	18,000	7.2	325	325	420
	Diodes		5000	Sn		200	Bulk	200	16,000	7.9	480	355	230
			5060			2,000	Tape, Ammo-Pack 52mm	2,000	16,000	7.5	325	325	260
			5070			1,500	Tape, Ammo-Pack 26mm	1,500	18,000	7.2	325	325	420
AX10	Zeners SIDACs	6,7	4000	Ag		200	Bulk	200	16,000	11.1	480	355	230
			4060			1,200	Tape, Ammo-Pack 52mm	1,200	18,000	14.4	325	325	420
			4061			2,500	Tape & Reel, Diameter 300 ϕ	2,500	12,500	10.8	325	325	420
	Diodes		5000	Sn		200	Bulk	200	16,000	11.1	480	355	230
			5060			1,200	Tape, Ammo-Pack 52mm	1,200	9,600	7.3	325	325	260
			5061			2,500	Tape & Reel, Diameter 300 ϕ	2,500	12,500	10.8	325	325	420
AX14		8	5000	Sn		200	Bulk	200	16,000	17.5	480	355	230
			5060			1,200	Tape, Ammo-Pack 52mm	1,200	9,600	11.2	325	325	260
			5061			2,500	Tape & Reel, Diameter 300 ϕ	2,500	10,000	13.0	350	355	350
AD		9	5000	Sn		50	Bulk	50	4,000	9.8	480	355	230
M1F		12	6063	Sn		2,500	Tape & Reel, Diameter 180 ϕ	15,000	75,000	4.5	405	210	220
1F		13,14	5103	Sn		100	Magazine	100	15,000	2.3	545	145	110
			5053		Standard	2,000	Tape & Reel, Diameter 180 ϕ	8,000	40,000	4.1	340	195	205
			5073			7,500	Tape & Reel, Diameter 330 ϕ	7,500	90,000	10.8	395	245	395
M2F		15	5063	Sn	Standard	1,000	Tape & Reel, Diameter 180 ϕ	4,000	20,000	3.4	340	195	205
			5073			4,000	Tape & Reel, Diameter 330 ϕ	4,000	48,000		395	245	395
2F		16	5103	Sn		60	Magazine	60	18,000	5.2	545	145	110
			5063			750	Tape & Reel, Diameter 180 ϕ	3,000	15,000	4.2	340	195	205
			5073			3,000	Tape & Reel, Diameter 330 ϕ	3,000	36,000	9.2	395	245	395
1Y	DIP	22	7101	Sn-Bi		100	Magazine	100	10,000	5.0	536	141	117
	SMD	21	7102			100	Magazine	100	10,000	5.0	536	141	117
			7062			1,000	Tape & Reel, Diameter 250 ϕ	1,000	8,000	5.3	274	219	291
			7072			2,000	Tape & Reel, Diameter 330 ϕ	2,000	16,000	8.8	349	244	361
1Z	DIP	24	7101	Sn-Bi	Only for S1ZB type	100	Magazine	100	10,000	2.1	545	145	110
	SMD	23	7102			100	Magazine	100	15,000	3.2	545	145	110
			7062			750	Tape & Reel, Diameter 180 ϕ	750	15,000	4.0	340	195	205
			7072			3,000	Tape & Reel, Diameter 330 ϕ	3,000	15,000	4.6	340	340	120
1N	DIP	26	7101	Sn-Bi		70	Magazine	70	5,600	4.1	545	145	100
	SMD	25	7102			70	Magazine	70	5,600	4.1	545	145	100
			7062			1,000	Tape & Reel, Diameter 250 ϕ	1,000	10,000	5.5	275	285	295
1NA	DIP	28	7101	Sn-Bi		70	Magazine	70	5,600	4.1	545	145	100
	SMD	27	7102			70	Magazine	70	5,600	4.1	545	145	100
			7062			1,000	Tape & Reel, Diameter 250 ϕ	1,000	10,000	5.5	275	285	295
1W	DIP	30	7101	Sn-Bi		50	Magazine	50	4,000	4.4	545	145	110
	SMD	29	7102			50	Magazine	50	4,000	4.4	545	145	110
			7062			1,000	Tape & Reel, Diameter 330 ϕ	1,000	6,000	5.5	395	245	395
			7072			2,000	Tape & Reel, Diameter 380 ϕ	2,000	10,000	7.8	395	245	395
E-pack	Only DE5VE40	31	5101	Sn		80	Magazine	80	10,000	6.9	560	130	109
			5061			1,500	Tape & Reel, Diameter 250 ϕ	1,500	6,000	2.9	260	260	99
			5071			3,000	Tape & Reel, Diameter 330 ϕ	3,000	12,000	5.5	335	335	99
	Other	31	7101	Sn-Bi		80	Magazine	80	10,000	6.9	560	130	109
			7061			1,500	Tape & Reel, Diameter 250 ϕ	1,500	6,000	2.9	260	260	99
			7071			3,000	Tape & Reel, Diameter 330 ϕ	3,000	12,000	5.5	335	335	99

Please make your orders: 'more than Inner Box Quantities' and 'a multiple of each Packing Unit'

Package		Fig.	Spec Code	Terminal Plating	Remarks	Quantity	Inner Box		Standard Packing		Packing Box (mm)		
							Method	Quantity (Pcs./Box)	Pcs./Box	Weight (kg)	L	W	H
SOPA-4		33	7062	Sn-Bi		1,000	Tape & Reel, Diameter 180 ϕ	1,000	20,000	3.6	340	195	205
FG		34	5071	Sn		800	Tape & Reel, Diameter 330 ϕ	800	4,000	9.5	375	360	250
STO-220		36	7102	Sn-Bi		50	Magazine	50	4,500	9.5	555	145	110
			7072			1,000	Tape & Reel, Diameter 330 ϕ	1,000	3,000	6.0	336	336	119
ITO-3P	MOSFET	43,44	7100	Sn-Bi		40	Magazine	40	1,200	8.0	624	151	92
	Diodes		7000			100	Bulk	500	2,000	9.7	362	332	121
MTO-3P	MOSFET	46	7100	Sn-Bi		30	Magazine	30	900	7.6	530	145	110
	Diodes		7000			100	Bulk	500	1,000	6.8	351	176	123
FTO-220		47,48	7600	Sn-Bi		100	Bulk	2,000	4,000	8.3	422	244	133
FTO-220A		49,50	7600	Sn-Bi		100	Bulk	2,000	4,000	8.3	422	244	133
FTO-220AG		51,51A	5600	Sn		100	Bulk	2,000	4,000	8.3	422	244	133
FTO-220G		52,52A	5600	Sn		100	Bulk	2,000	4,000	8.3	422	244	133
D3K		54	7000	Sn-Bi		500	Bulk	500	2,500	4.0	210	188	200
1V		55	7000	Sn-Bi		100	Bulk	100	8,000	9.7	395	350	235
2S		56	7000	Sn-Bi		100	Bulk	500	6,000	14.4	410	380	170
3S		57	7000	Sn-Bi		50	Bulk	250	2,000	9.5	305	280	183
5S		58	7000	Sn-Bi		50	Bulk	250	2,000	14.5	330	330	215
TSB		59,60	7000	Sn-Bi		100	Bulk	100	400	9.8	351	269	164
S2VB		61	5000	Sn-Ag-Cu		100	Tray	100	1,000	3.6	265	255	170
S4VB		62	5000	Sn-Ag-Cu		100	Tray	100	1,000	5.9	315	285	220
S5VB		63	5000	Sn-Ag-Cu		100	Tray	100	1,000	10.4	415	285	300
S10VB		64	5000	Sn-Ag-Cu		100	Tray	100	1,000	9.3	375	285	270
S15VB		65	4000	Ag		100	Tray	100	500	9.0	415	285	180
S25VB		66	4000	Ag		60	Bulk	60	300	7.0	335	205	165
S50VB		67	4000	Ag		50	Tray	50	200	6.2	335	205	165
S3WB		68	5000	Sn-Ag-Cu		100	Tray	100	1,000	6.1	315	285	220
S10WB		69	5000	Sn-Ag-Cu		100	Tray	100	1,000	9.3	375	285	270
S15WB		70	5000	Sn-Ag-Cu		100	Tray	100	1,000	15.1	415	285	300
S20WB		71	5000	Sn-Ag-Cu		100	Tray	100	700	15.0	415	285	300
JA		72	7000	Sn-Bi		100	Bulk	20	2,000	9.0	327	329	185
SVTA		73	5000	Sn-Ag-Cu		50	Tray	50	250	8.7	460	295	240
SVT		74	4000	Ag		45	Bulk	200	200	13.6	420	345	190
JB		75	7000	Sn-Bi		50	Bulk	25	2,000	7.4	287	301	169
D30VC		76	4000	Ag		100	Tray	100	500	7.0	375	285	160
Module		77-79	4000	Ni		25	Bulk	25	200	13.4	480	330	210
MCP		80	4062	Ni		300	Tape & Reel, Diameter 255 ϕ	300	1,500	5.0	280	275	190
			4072			600	Tape & Reel, Diameter 330 ϕ	600	1,800	5.5	335	345	110
HSOP28 (MD□F·MTD□F)		81	3072	Ni/Pd/Au		1,000	Tape & Reel, Diameter 330 ϕ	1,000	3,000	7.3	350	350	140
HSOP40 (MTD□J)		82	3072	Ni/Pd/Au		1,000	Tape & Reel, Diameter 330 ϕ	1,000	3,000	7.0	350	350	140
SSOP32		83	3072	Ni/Pd/Au		2,000	Tape & Reel, Diameter 330 ϕ	2,000	6,000	7.3	350	350	140
LSSOP26		84	3072	Ni/Pd/Au		3,000	Tape & Reel, Diameter 330 ϕ	3,000	9,000	5.2	350	350	140
FTO-7P (MR4000 Series)		86	7101	Sn-Bi		50	Magazine	50	1,400	4.3	526	141	104
ZIP27 (MTA·MTD)		89	7101	Sn-Bi		15	Magazine	15	450	5.3	640	180	105
SOP8		90	7062	Sn-Bi		1,000	Tape & Reel, Diameter 180 ϕ	1,000	10,000	2.5	300	265	220
HSOP24		91	3072	Ni/Pd/Au		2,000	Tape & Reel, Diameter 330 ϕ	2,000	6,000	7.3	350	350	140
SZIP32		93	7101	Sn-Bi		20	Magazine	20	4,000	15.0	641	241	164
MTO-3PT		95,96	5000	Sn		100	Bulk	500	1,000	6.8	351	176	123
MTO-3PV		98	5000	Sn		50	Bulk	500	1,000	6.8	351	176	123
			5100			30	Magazine	30	900	7.6	530	145	110
FB		99	5071	Sn		3,000	Tape & Reel, Diameter 330 ϕ	3,000	36,000	15.0	380	365	390
FE		100	5061	Sn		1,500	Tape & Reel, Diameter 180 ϕ	1,500	6,000	2.9	260	260	99
			5071			3,000	Tape & Reel, Diameter 330 ϕ	3,000	12,000	5.5	335	335	99

MEMO

MEMO

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- All specifications are subject to change without notice.
- Please consult us for the latest specifications before you order.
- Please use this products after reading manual well.

This catalog includes the products which might be subject to the foreign exchange and foreign trade laws.

Printed May. 2012

新電元
SHINDENGEN

新電元
SHINDENGEN

Package Outline

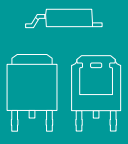

M1F

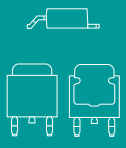

1F

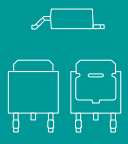

M2F


2F


MCP


FB


E-pack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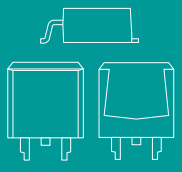
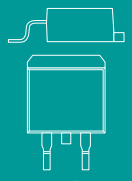

STO-220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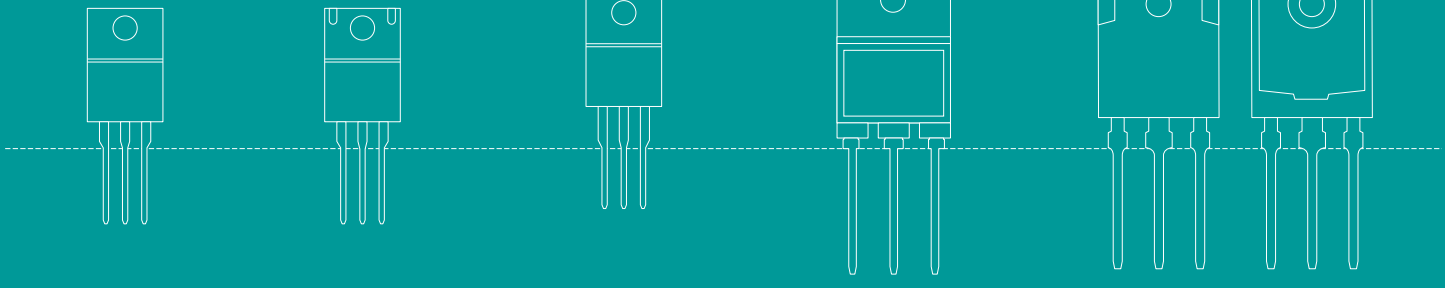
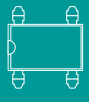

FTO-220A,220AG　FTO-220G　FTO-220　ITO-3P　MTO-3P,3PT,3PV

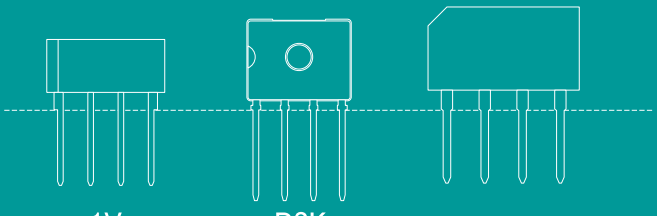

SOPA-4

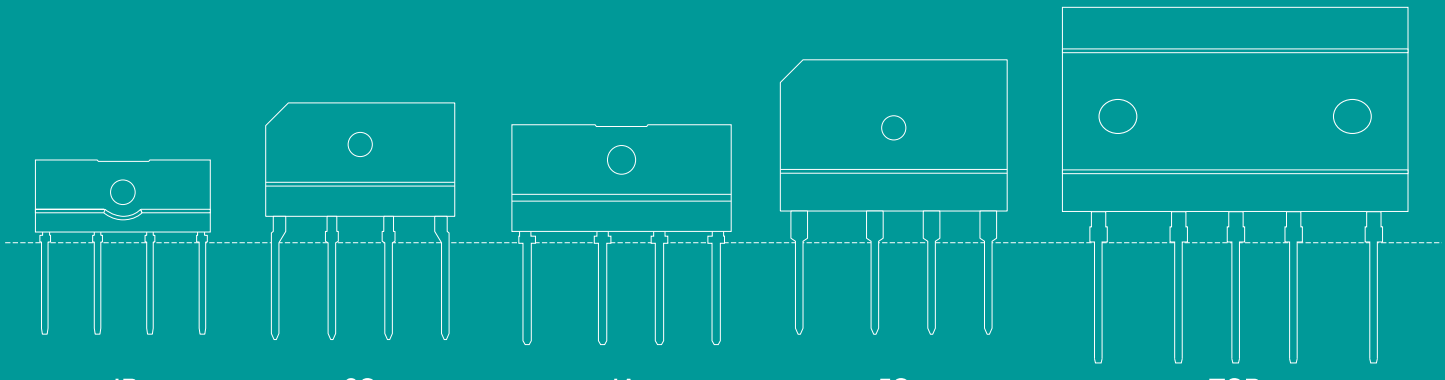

1Z

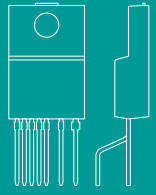

1Y


1NA


1W


1V　D3K　2S


JB　3S　JA　5S　TSB


FTO-7p

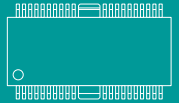

SOP8


LSSOP26


HSOP24


SSOP32


HSOP28


HSOP40

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